TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 22.] 1925. [No. 9

KALA AZAR.

CHRISTOPHERS (S. R.), SHORTT (H. E.), & BARRAUD (P. J.). **The Development of the Parasite of Indian Kala-Azar in the Sandfly** *Phlebotomus argentipes* **Annandale and Brunetti.**—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 605–607.

The authors, working in Assam, are able to confirm the observation of KNOWLES, NAPIER and SMITH (*ante*, p. 193) that *L. donovani* develops into flagellates and multiplies in the intestine of *Phlebotomus argentipes* fed on the peripheral blood of kala azar cases. Only wild flies were used, and 13 which had fed on suitable cases were examined at intervals of 1 to 5 days after feeding. In 5 of these flagellates were found. In one fly 40–50 flagellates occurred in the mid gut, in another they were very numerous. Seventy-four females and 23 males were dissected as controls with negative results. The authors note that during November and December search of houses in which kala azar cases had recently occurred in Assam did not reveal any sand flies, which were found almost exclusively in stables and without any definite relation to the incidence of the disease.

C. M. Wenyon.

MELENEY (Henry Edmund). **The Histopathology of Kala-Azar in the Hamster, Monkey, and Man.**—*Amer. Jl. Path.* 1925. Mar. Vol. 1. No. 2. (Whole No. 2.) pp. 147–167. With 6 plates. [16 refs.]

——. **Kala-Azar in China with Special Reference to its Histopathology in Experimentally Infected Hamsters.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1925. May. Vol. 18. No. 7. pp. 33–40. With 6 text figs. [13 refs.]

It has already been reported that the hamster (*Cricetulus griseus*) of N. China is very readily infected with *Leishmania donovani* (this *Bulletin*, Vol. 21, p. 720). The infection progresses in intensity over long periods, and in spite of this the animal often remains in what appears to be perfect health. In one case an animal apparently healthy was killed on the 455th day and was found to be very heavily infected. Macroscopically at post mortem examination the only pathological sign is the enlargement of the spleen. In the normal

animal it is 0·15 to 0·3 per cent. of the total body weight, while in the animal referred to above it weighed 1·0 gm. and was 3·1 per cent. of the body weight. Usually the liver shows no change, but exceptionally it may be greatly enlarged.

Microscopically it was found that there was a specific tissue reaction in the form of endothelial proliferation forming masses of " clasmatocytes " heavily parasitized. The chief organs affected were the liver, spleen lymph nodes and bone marrow. In advanced infections the parasites also attack the parenchymatous cells of the liver and adrenal cortex, extensive degeneration of the liver occurs, and infected " clasmatocytes " appear in practically every organ and tissue, the stroma of the intestinal mucosa being the site of massive accumulations of these cells. In spite of the heavy infections of the intestinal wall the epithelium remained intact, so that the damaged epithelium observed by PERRY (this *Bulletin*, Vol. 20, p. 95) in similar infections in a human case is probably a post mortem change. In two monkeys

The Striped Hamster, *Cricetulus griseus* M. Edw., from Peking, China. About one-half life size. The adult measures about 8 cm. in length and weighs about 30 gm.

[Reproduced by permission from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*, Vol. 18. No. 8.]

infection produced a similar picture of endothelial proliferation as also in human cases. The paper, which is a most important contribution to the pathology of kala azar, is illustrated by a photograph of the hamster (reproduced here) and microphotographs and coloured drawings of sections of various organs showing the characteristic tissue reaction.

The second paper is a summary of the matter discussed in the first.

C. M. W.

NAPIER (L. EVERARD). **A Comparative Study of the Environment associated with Kala-Azar Prevalence in Calcutta.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 755–772. With 3 maps and 3 figs. on 1 plate. [2 refs.]

The cases of kala azar treated at the School of Tropical Medicine, Calcutta, during 18 months up to March, 1923, were investigated

from the point of view of the source of infection. Those which had come to Calcutta for treatment were fairly uniformly distributed about the town, but those which had evidently contracted the disease in Calcutta itself were concentrated in one area, while there was complete absence of the disease from another area. It was previously shown that this concentration could not be due altogether to racial or caste differences in the population, and a careful survey of the two areas was made to discover if possible any features which might account for the distribution. It was found that the disease was definitely associated with vegetation in close propinquity to the dwellings, earth unprotected by cement or paving-stones in and around the dwellings, and ground floor residence. In addition, insanitary conditions, especially with reference to fowls and ducks in and about the houses, may possibly have to be added, while in the endemic area itself masonry houses in contradistinction to those of bamboo or khola seemed to have a bearing on the incidence of the disease. In both areas ample opportunity of bed bug and mosquito transmission occur, while lack of sanitation alone cannot be the only factor, as this also occurs in areas where the disease is not found. The ground floor factor suggests an insect with a small range of flight, such as the Culicoides or the sand fly. Vegetation, especially its decaying and moist debris, is suggestive of the former, though possibly this is also necessary for the male sand fly. Uncovered earth, masonry and nitrogenous matter supplied by domestic animals makes the balance of evidence appear to be slightly in favour of the sand fly.

C. M. W.

CUNNINGHAM (J.) & PUNDIT (S. R.). **A New Endemic Focus of Kala-Azar in Southern India.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 743–754. With 8 figs. on 1 plate & 3 maps in text. [2 refs.]

The paper records a new endemic focus of kala azar in the Madras Presidency. It occurs in the Tinnevelly District about 20 miles from Cape Comorin. There is evidence that this focus is only a part of a more extensive endemic area extending along this part of the littoral. Of 122 suspected cases examined 56 were definitely proved to be kala azar, which corresponds with the disease as it is observed in other endemic areas. A feature which may be of importance from the point of view of etiology is that the disease was limited entirely to the Mahomedans, although the Hindus live in close propinquity with them. Enquiry has shown that the local inhabitants have recognised the disease since 1884 and have noted 2 epidemic phases in 1884 and 1909.

C. M. W.

MAITRA (Jogendranath). **Is Kala-Azar Contagious ?**—*Calcutta Med. Jl.* 1925. Feb. Vol. 20. No. 8. pp. 315–317. With 1 plate.

As an argument in favour of the possibility of contagion in kala azar a family is mentioned in which a woman suffering from kala azar came with her husband to Calcutta for treatment. She was cured, after which a healthy child was born. The father was then found

to be suffering from the disease and three months later the infant also. Both the father and the child were cured. The author states that he knows of other families in which various members have contracted the disease.

C. M. W.

MAGGIORE (Salvatore). **Contributo allo studio etio-patogenetico delle infezioni da Leishmania.**—*Pediatria.* 1925. Feb. 15. Vol. 33. No. 4. pp. 169–172. [5 refs.]

A series of cutaneous and subcutaneous inoculations was made in human beings with *Leishmania donovani*, taken directly from the bone marrow of a case of kala azar, with cultures of *L. donovani* and with cultures of *L. tropica*. In no case did infection result. In a second series four individuals were inoculated with *L. donovani* directly from a case of kala azar, three with cultures of *L. donovani* and three with cultures of *L. tropica*. In none of these cases did any infection take place. These results are contrasted with the well-known fact that direct inoculation of *L. tropica* from a human case of oriental sore into the skin of a healthy human being reproduces the disease, and that the inoculation of *L. donovani* into the skin of animals may give rise to local lesions. It is maintained that the negative results obtained offer another proof of the biological difference between *L. donovani* and *L. tropica*.

C. M. W.

JESSNER (Max) & AMSTER (Siegfried). **Leishmaniavakzine—Leishmaniinreaktion.**—*Deut. Med. Woch.* 1925. May 8. Vol. 51. No. 19. p. 784.

A strain of *Leishmania tropica* was maintained in dogs and in culture. A blood-free vaccine was prepared from the cultural forms, and it was found that the injection of the diluted vaccine (1 in 10) into the skin of dogs suffering from oriental sore produced a marked reaction in the form of a red swelling which persisted for 48 hours. In healthy dogs and those recovered from infection no reaction, or at most a very transitory one, occurred. When it was tested on a human case of the disease an even more definite reaction occurred, while controls showed only a slight reddening of the skin. The use of the test as an aid to diagnosis is advocated.

C. M. W.

GANGULI (P.). **The Value of the Aldehyde Test in the Diagnosis of Kala-Azar.**—*Indian Med. Gaz.* 1925. May. Vol. 60. No. 5. pp. 204–206.

As improved methods of diagnosis of kala azar are becoming more general, long-standing cases in which the aldehyde test gives a+++ reaction are less frequently seen. It is becoming increasingly important to determine the value of the aldehyde test as applied to early cases when the reaction is + or ++. Such results have been obtained in 5 cases with chronic skin disease, 8 cases of convalescent pneumonia and 3 cases of chronic malaria, and, as previously noted by the author (this *Bulletin*, Vol 21, p. 715), in a mild case of splenomedullary leukaemia. It is noted that the reaction depends on the gradual

increase of the euglobulin content of the blood associated with the development of antibodies which are intimately bound up with this substance. From the results obtained it follows that the value of the aldehyde test is purely a negative one. If a case of suspected kala azar of over 5 months standing gives a negative reaction it can safely be assumed that it is not one of this disease.

C. M. W.

NICOLLE (Charles). **Chronique du kala azar en Tunisie.**—*Arch. Inst. Pasteur de Tunis.* 1925. Jan. Vol. 14. No. 1. pp. 136–139. [2 refs.]

This is a note relating to the incidence of infantile kala azar and other details connected with the disease in Tunisia. To the list of 62 cases previously recorded 5 new ones are now added. Of these cases 37 were in children between 1 and 3 years of age, the eldest being 9½. Interesting information regarding the maintenance of cultures of the organism are given. Three strains were isolated from human cases in September, 1910, February, 1912, and August, 1918. Up to the end of 1924 they had been subcultured 395, 345 and 163 times. Two strains from dogs isolated in December, 1911, and February, 1913, have been subcultured 345 and 334 times. Three strains from oriental sores isolated November, 1909, November, 1919, and December, 1919, have been subcultured 384, 132 and 130 times. Two strains of the leptomonas which can be cultivated from the blood of geckos were isolated in April–May, 1917, and have passed through 188 subcultures and two strains isolated in October, 1919, have passed through 134. A trypanosome of the toad isolated in May, 1917, has been subcultured 193 times.

C. M. W.

D'OELSNITZ, DAUMAS, LIOTARD & PUECH. **Quatre cas de kala-azar d'origine française. Résultats favorables du traitement par les injections intraveineuses d'émétique de soude.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. Feb. 26. Year 41. 3rd Ser. Vol. 49. No. 7. pp. 255–267. With 5 text figs.

The paper gives an account of 4 cases of infantile kala azar which came under observation at the hospital in Nice, in the South of France. Taking into account the cases previously recorded from this littoral, it appears evident that, though the disease is not so common as in other parts of the Mediterranean area, cases will be repeatedly encountered. It is probably more common than the recorded cases indicate as it is often not suspected. The 4 cases noted in this paper were treated with sodium antimonyl tartrate. Three recovered and one died. Parasites were discovered in the peripheral blood of one of the cases.

C. M. W.

SHORTT (H. E.) & BRAHMACHARI (U. N.). **Chemotherapy of Antimonial Compounds in Kala-Azar Infection. Part XIII. Further Observation on Dermal Leishmanoid.**—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 463–466. With 2 plates. [2 refs.]

Three years ago BRAHMACHARI (this *Bulletin*, Vol. 19, p. 551) described a peculiar skin eruption which occurred in a man who had

been treated for kala azar. The eruption was shown to be due to infection of the skin by leishmania. In the paper now under review a second case of the same kind is described. The patient was treated for kala azar with injections of sodium antimonyl tartrate. A relapse occurred in 6 months, and another course of the same treatment was given. Nine months after this course a peculiar skin eruption was noticed. It appeared first as nodules over the ear but extended to other parts of the body. Besides the nodules there occurred a number of slightly raised brown patches. Leishmania were present in the nodules, but none could be cultivated from the peripheral blood. The patient was given a course of urea stibamine, which caused some subsidence of the skin eruption. Three months later he had still further improved, but a few nodules and patches were present. It appeared that the eruption was due to infection of the skin with leishmania rendered somewhat resistant to antimony by previous treatment. Histological examination of a nodule showed that in the cutis vera there occurred a deep layer of cells which infiltrated the usual open connective tissue. In these cells, which appeared to be those ultimately differentiated as endothelial and stroma cells, leishmania occurred. The paper is illustrated by an excellent coloured plate of the skin lesions and microphotographs of sections of a nodule.

C. M. W.

Acuna et al. [**Kala-Azar in Children.**]—*Prensa Méd.* Buenos Aires. 1924. Nov. 30. Vol. 11. p. 585. [Summarized in *Jl. Amer. Med. Assoc.* 1925. Jan. 17. Vol. 84. No. 3. p. 237.]

This summary states that the authors have seen a case of kala azar in a child under 3 years of age in the Argentine. The child had been ill for 6 months, and necropsy revealed parasites swarming in the blood-producing organs. The note continues that none had been found in the stools, but puncture of the spleen had cleared up the diagnosis. [The statement regarding the absence of parasites from the stools suggests a lack of knowledge regarding the methods of diagnosis of kala azar. If this case is authentic it is the first autochthonous one from S. America.]

C. M. W.

Innes (Flora R.). **Three Unusual Cases of Kala-Azar.**—*Jl. Assoc. Med. Women in India.* 1925. Feb. Vol. 13. No. 1. pp. 40–43.

Three cases which appeared to be kala azar from the positive formaldehyde test and the response to tartar emetic treatment, showed peculiar symptoms. One case presented the picture of typical acute nephritis, one a history of the same condition followed six months later by sub-acute nephritis, and one tachycardia, oedema, and suppression of urine. The suggestion was made by Dr. Muir that all 3 cases were probably examples of hypo-adrenia due to concentration of the leishmania in the adrenals.

C. M. W.

Lemierre (A.), Leon-Kindberg (M.) & Bernard (Etienne). **Kala-azar tunisien à évolution mortelle chez une adulte.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. Apr. 9. Year 41. 3rd Ser. Vol. 49. No. 13. pp. 537–546. With 1 text fig. [9 refs.]

The paper describes a case of kala azar in a woman twenty-six years of age. It is of interest that the disease was contracted at Goulette, in Tunisia, where children alone have hitherto been found infected, and where the

first case of Mediterranean kala azar was discovered by CATHOERE in 1904. The disease was of a particularly resistant type, and did not respond to injections of stibenyl, the patient dying in France eight months after the onset of symptoms. During the course of the illness torsion of the pedicle of the spleen, necessitating splenectomy, occurred. It was not possible to obtain any information regarding the origin of the infection. The patient had lived in well appointed military quarters and had never been associated with dogs.

C. M. W.

NAPIER (L. E.). **A Preliminary Note on the Successful Treatment of Kala-Azar with "Stibamine Glucoside."**—*Indian Med. Gaz.* 1925. Jan. Vol. 60. No. 1. pp. 24–26. [4 refs.]

Owing to the good results following the use of von Heyden 471 (meta-chlor-para-acetyl-amino-phenyl stibiate of sodium) in the treatment of kala azar in Calcutta, the drug has been adopted as the standard treatment in the wards of the Carmichael Hospital for Tropical Diseases. In addition treatment has been carried out with "stibamine glucoside" prepared by Dr. HENRY, of the Wellcome Research Laboratories. Ten cases have been treated with this drug, and it is quite obvious that it is far superior to the antimony tartrates and that it compares very favourably with von Heyden 471 and urea stibamine. The compound is easily soluble in distilled water to a 4 per cent. solution. It was injected intravenously in doses of 0·05 to 0·3 gm. After some trials it was found that an initial dose of 0·1 gm. and a maximum dose of 0·2 gm. for a patient weighing over 50 lb. was satisfactory, and it seems probable that this will be a good system to adopt. The injections were given as a rule on alternate days. Of the 10 cases treated, 9 have recovered. One patient died, but he was admitted to hospital in a dying condition; though some improvement occurred, death took place suddenly from collapse 48 hours after the fifth injection.

C. M. W.

BRAHMACHARI (Upendra Nath) & MAITY (Bibhuty Bhusan). **Chemotherapy of Antimonial Compounds in Kala-Azar Infection. Part XIV. Observations on a Series of Cases of Kala-Azar treated with Urea Stibamine during a Course of 32 Hours to 7 days.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 735–740.

The authors have collected information regarding 27 cases of kala azar (18 of their own and 9 of other observers) which were treated successfully with urea stibamine for 7 days or less. In all these cases parasites disappeared from the organs and clinical recovery followed. In a few cases the procedure of giving multiple injections on one day so as to maintain a constant high concentration of urea stibamine in the blood has led to a remarkable shortening of the period required for sterilization of the peripheral blood. No untoward result followed this method of medication. It is pointed out that the mechanism of action of antimonial preparations on Leishmania is a very complicated one. Urea stibamine is generally admitted to rid the patient of the parasites in a much shorter time than potassium or sodium antimonyl tartrate, but even with urea stibamine the time required to bring about this result varies with individual patients. Some cases are much more quickly amenable to treatment than others. The mechanism of this

variability is a subject worthy of investigation. The period of observation of the cases recorded is as a rule short, but 4 of them have remained healthy for 3, 5, 5 and 5½ months respectively.

C. M. W.

GREIG (E. D. W.) & KUNDU (S.). **Observations on the Quantity of Urea Stibamine, "471" (von Heyden) and Stibamine Glucoside required for the Complete Treatment of a Case of Kala-Azar.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 679–688. With 4 figs. on 2 plates. [3 refs.]

The object of the investigation, the results of which are detailed in this paper, was to determine, as nearly as possible, the quantity of urea stibamine, "471" (von Heyden) and stibamine glucoside required to destroy completely the parasite in cases of kala azar. Most of the 68 cases of which the tests were made had proved resistant to tartar emetic. The drugs were administered intravenously on alternate days in the following doses :—Urea stibamine (adults) 0·20 to 0·25 gm. (children) 0·1 to 0·20 gm. ; "471" (adults) 0·2 to 0·3 gm. ; (children, one case only) 0.05 to 0.20 gm. ; stibamine glucoside (adults) 0·1 to 0·3 gm. ; (children) 0·05 to 0.10 gm. The strengths of solutions used in percentages were 2, 1 to 3, and 1 to 3 respectively. The progress of the cure was controlled by spleen or liver puncture and culture from the material obtained. Of 52 cases treated with urea stibamine, one proved resistant and is not included. Similarly, of 14 cases treated with "471" three are omitted, one having died during treatment, one not having completed the course and one proving resistant. With stibamine glucoside only two cases were treated. All the cases, 64 in number, on which the calculations are based were cured. The quantities of urea stibamine, "471" and stibamine glucoside required to complete the treatment of a case are 4·2 gm., 3·49 and 1·85 to 2·05 gm. The mean sterilizing quantities of the three drugs in grammes per kilogram of body weight are 0·053, 0·060 and 0·042 respectively. It is concluded that the results appear to indicate that the three drugs are of the same order of efficiency in the treatment of kala azar.

C. M. W.

GREIG (E. D. W.) & KUNDU (S.). **Observations on Two Cases of Kala-Azar resistant to Treatment.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 689–694. [2 refs.]

During the course of the investigations described in the above paper two cases of kala azar were encountered which proved resistant to urea stibamine and "471." Both had resisted previous treatment with tartar emetic. One of the cases had received 0·203 gm. of urea stibamine per kilogram of body weight and the other 0·116 gm., yet parasites still persisted in spite of the fact that increase in body weight had taken place.

C. M. W.

KAPUR (N. C.). **Observations on the Treatment of Kala-Azar with Urea Stibamine in the Medical Out-Patient Department of the Medical College Hospital, Calcutta.**—*Indian Med. Gaz.* 1925. May. Vol. 60. No. 5. pp. 206–210.

The paper describes in tabular form the result of treatment of 50 cases of kala azar with urea stibamine. Twenty-five of the cases had

proved resistant to previous treatment with tartar emetic. All the cases recovered. The following observations are made :—

(1) The course of treatment necessary, when compared with the minimum of 3 months for tartar emetic, is remarkably short. In some cases cure followed a 7-day course of treatment.

(2) The average number of injections is 7 to 10, whereas with tartar emetic as many as 30 or more are frequently required.

(3) The beneficial effects in cases resistant to antimony tartrate were clearly shown.

(4) Jaundice and albuminaria are no contraindications to administration of urea stibamine if small doses, gradually increased, are given.

(5) There were no signs of intolerance even in cases which were intolerant of tartar emetic.

(6) Splenic enlargement, fever and leucopenia rapidly disappeared.

C. M. W.

IZAR (Guido). **Sur le traitement de la leishmaniose interne.**—*Presse Méd.* 1925. Mar. 7. Vol. 33. No. 19. p. 303.

Two cases of infantile kala azar which proved resistant to tartar emetic were treated by intravenous injections of the sulphate of sanguinarine, the alkaloid of *Sanguinaria canadensis* and the hydrochloride of isoamylhydrocuprein. It is stated that after 3 months a definite cure resulted. The author has been unable to continue his observations, but suggests that instead of injecting the drugs separately a mixture could be prepared containing 0·4 gm. of the first drug and 4 gm. of the second in 100 cc. of distilled water. The proposed dose is 0·25 cc. increasing by 0·25 cc. up to 2 cc., injections to be given twice a week.

C. M. W.

DE SOUZA (Salazar). **La splénectomie dans le kala-azar infantile.**—*Revista Méd. de Angola.* (No. especial 1ᵉ Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 409–417.

The paper discusses the value of splenectomy in the treatment of kala azar. In the author's experience of this operation in other conditions, such as Banti's disease, the immediate result has been an increase in the haemoglobin of the blood and a leucocytosis. He has already expressed the opinion that the spleen, possibly by virtue of a hormone, exercises a controlling influence on the amount of haemoglobin in the blood. As a result of these observations he was led to practice splenectomy in cases of infantile kala azar in Portugal, but the reports of the good results from Italy and elsewhere following tartar emetic or stibenyl medication led him to abandon the operation in favour of simple drug treatment. This change, however, did not lead to any improvement, so much so that he has again adopted splenectomy with the modification of administering tartar emetic or stibenyl in certain cases. The figures are as follows :—Eight cases were treated with intravenous or intramuscular tartar emetic alone. Of these five died of the disease, one was cured, one abandoned the treatment, and one did not respond, the disease being considerably aggravated. Seven cases were treated with stibenyl alone. Six died and in one the condition was aggravated. Fourteen cases were treated

by splenectomy alone. Of these five died, two from the shock of the operation and three from the disease itself, though in these three cases the haemoglobin had increased in amount. Of the nine cases which recovered four were absolutely cured, four were clinically cured, and one died of an enteritis which appeared to have no connection with the previous condition. Of the eight cases regarded as cured, one died a year after the operation from influenza and nephritis, another more than a year after from typhoid fever, and another from pulmonary tuberculosis. These deaths, the author states, have no connection with the operation or its results. Of cases treated by splenectomy followed by tartar emetic or stibenyl injections, there were six. Of these, three were absolutely cured, while three died, one from tubercular meningitis, one from pleurisy and pneumonia, and one from shock of the operation.

As a result of these experiences in the treatment of infantile kala azar, the author advises splenectomy with the object of increasing the haemoglobin, followed by an injection of tartar emetic if the disease still progresses.

C. M. W.

NOGUCHI (Hideyo) & LINDENBERG (Adolph). **The Isolation and Maintenance of Leishmania on the Medium Employed for the Cultivation of Organisms of the Leptospira Group of Spirochetes.**—*Amer. Jl. Trop. Med.* 1925. Jan. Vol. 5. No. 1. pp. 63–67. With 1 plate. [3 refs.]

KLIGLER recently noted (this *Bulletin*, Vol. 21, p. 726) that NOGUCHI's medium used for the cultivation of leptospira was very suitable for the growth of *Leishmania tropica*, which often remained viable in a tube for at least 6 months. It was not clear that this medium would be suitable for the primary isolation of cultures from a sore. The authors of the paper under review have had an opportunity of testing this point and have found that it is highly advantageous for the isolation and maintenance of *L. tropica*.

The medium, which remains stable at ice-box temperature, is prepared as follows :—

	Parts.
0·9 per cent. saline	800
Fresh rabbit serum	100
2 per cent. nutrient agar (pH 7·2)	100
Rabbit haemoglobin (made by taking 1 part of defibrinated rabbit blood with 3 parts of distilled water) ...	10–20

C. M. W.

NOGUCHI (Hideyo). **Action of Certain Biological, Chemical, and Physical Agents upon Cultures of Leishmania ; some Observations on Plant and Insect Herpetomonads.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 455–478. With 4 plates. [21 refs.] [United Fruit Company, Boston, Mass.]

Taking advantage of the ready growth of *Leishmania tropica* and other species in the medium noted in the above review, the author has carried out a series of experiments with the cultures. It was found that the growth of flagellates was limited to the superficial layers and forms a scum-like colony 2–4 mm. in thickness. The scum is practically a pure mass of organisms. It can be removed and will reform

in the course of another week. This process of removal can be repeated for several months till the medium is exhausted.

Serological tests were made with *L. donovani*, *L. infantum*, *L. tropica* and *L. brasiliensis*. Rabbits were inoculated intravenously on four successive occasions at 5 to 7 day intervals with rich living cultures, and their sera were tested against the flagellates for agglutinins. Both the *L. donovani* and *L. infantum* sera agglutinated both *L. donovani* and *L. infantum* but not *L. tropica* nor *L. brasiliensis*. Similarly, the sera of the last two parasites had no action on the first two. Furthermore, the *L. tropica* sera agglutinated only *L. tropica* and the *L. brasiliensis* serum only *L. brasiliensis*. Serum diluted 1 : 10 caused prompt and powerful agglutination, while that diluted 1 : 100 was moderately active. The author concludes that the agglutination test permits the separation of at least three species of Leishmania. If immune serum is added to the medium to a strength of 10 per cent. the homologous organism grows in isolated colonies instead of in the usual scum.

It was found that all strains require oxygen for their growth, which does not take place in atmospheres of hydrogen, nitrogen, or carbon dioxide. As regards the reaction of the medium, good growth occurs within the range pH 5·08 to pH 7·21.

Certain phytotoxins and plant toxalbumins kill the flagellates. Saponin in a dilution of 1 : 10,000 killed them without dissolution. Ricin caused immobilization and agglutination in dilutions of 1 : 100 but abrin had no action. Animal poisons are also active. The venom of the Indian cobra affected the flagellates in 1 : 2,000 dilution in 0·9 per cent. saline, while a dilution of 1 : 20,000 killed them if a small amount of lecithin was added. The venoms of a number of other snakes were found to be quite inactive, but those of Lachesis and Ancistrodon became active in the presence of lecithin. Tartar emetic and salvarsan had no marked action on the flagellates. Contact of the drugs with fresh animal tissue did not yield a more toxic product. The photodynamic properties of certain fluorescent dyes was also tested. It was found that in certain dilutions these dyes had no action on the flagellates, unless actinic rays were present, when they became remarkably germicidal. Neutroflavine failed to kill the flagellates, as well as various spirochaetes, in dilution greater than 1 : 50,000, but did so in dilution of 1 : 10,000,000 if actinic rays were acting at the same time.

The flagellates of plants (*Asclepias curassavica* and *Eurphorbia brasiliensis*) of Tela, Honduras, as well as those from a plant (*Asclepias syriaca*) of New York, and from a bug (*Oncopeltus cingulifer*) off *A. curassavica* were studied. Cultures were not obtained, but it was found that none of the leishmania sera had any action on the flagellates as they occurred in the latex of the plants or in the intestinal contents of the bug.

The paper, which contains a mass of details, only some of which have been noted in this review, is well illustrated with coloured plates showing the character of the growth of the various species of Leishmania in test tubes and the changes brought about by the addition of sera, the characters of the cultural forms of the organisms, the flagellates of plants and the plants themselves, together with the bug mentioned above.

C. M. W.

Schulz (Martin). **Die Kernteilung von** *Leptomonas fasciculata* **nebst einem Vergleich mit der Kernteilung bei** *Leishmania donovani.* [Nuclear Division of *L. fasciculata* and its Comparison with the same Process in *L. donovani.*—*Arch. f. Protistenk.* 1924. Nov. 5. Vol. 49. No. 2. pp. 216–236. With 1 plate. [47 refs.]

The author has studied the nuclear division of *Leptomonas fasciculata* (of *Culex pipiens* and *Theobaldia annulata*) and *Leishmania donovani* during multiplication in cultures on blood agar plates. In both cases the central karyosome elongates, and it is found that it is actually a spindle. In the case of *L. fasciculata* three chromatin granules appear in the spindle. They divide to form daughter granules and behave like chromosomes except that an equatorial plate is not formed. In *L. donovani* likewise a spindle is formed, and though an equatorial plate appears, individual chromosomes could not be distinguished. Thus in both cases nuclear division is by a modified mitosis.

C. M. W.

Lwoff (André). **Croissance hypertrophique, division multiple et constitution de la cinétide de** *Leishmania donovani* **Lav. et Mes., type** *infantum* **Ch. N.**—*C.R. Soc. Biol.* 1925. Jan. 30. Vol. 92. No. 3. pp. 160–163. With 20 figs.

The author, who has obtained very rich cultures of *L. donovani* in a blood-bouillon medium, noted that nuclear multiplication sometimes proceeded so rapidly as to give rise to multinucleated plasmodia which contained as many as ten to fifteen nuclei, kinetoplasts and flagella. These forms resembled the well-known multinucleated forms which occur during the reproduction of *Trypanosoma lewisi* in the blood of the rat. Certain flagellates possessed a terminal spine which stained deeply. This represented the last point of attachment of two daughter flagellates resulting from longitudinal fission. The spine is regarded as representing the remains of a centrodesmose which, during division of the kinetoplast, connects the daughter kinetoplasts. In some flagellates fibres originating in the blepharoplast could be detected. There was usually a single fibre, but in other cases two were present. The fibre varied in length. Sometimes it ended in the cytoplasm before reaching the nucleus, at other times it appeared to pass into the nucleus, while in some flagellates it was continued past the nucleus to the posterior end of the body towards the spinous process, with which in rare cases it was actually connected. The fibre again is regarded as the remains of the centrodesmose.

C. M. W.

Greig (E. D. W.) & Kundu (S.). **Observations of Glycosuria and Blood Sugar Content in Kala-Azar.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 695–699. [5 refs.]

The paper records a case of kala azar in which glycosuria was a prominent feature. The blood sugar content as estimated by MacLean's method was 0·461 per cent., while the urine contained 38·4 grains of sugar per ounce. In kala azar cases generally the sugar content of the blood is low, so that it would appear that in this case, in a patient 17 years of age, the condition was probably due to damage to the beta cells of the Islands of Langerhans caused by the Leishmania. The patient was treated with insulin and urea stibamine and made an uninterrupted recovery. As he was young there is a good chance that the damage to the beta cells will be repaired.

C. M. W.

NATTAN-LARRIER (L.). **La leishmaniose cutanée de la Guyane.**—*Bull. Acad. Méd.* 1925. Mar. 17. Year 89. 3rd Ser. Vol. 93. No. 11. pp. 308–310.

The paper gives a short summary of knowledge regarding cutaneous leishmaniasis in Guiana. Though there are no morphological differences between the parasites as seen in the diseases of the old and new worlds it is possible that the S. American parasite is actually distinct from *L. tropica*. Furthermore, it is suggested that the disease in Guiana may not be merely a mild form of that occurring in other parts of S. America but a distinct entity.

C. M. W.

ARBERNAZ (Paulo Mangabeira). **Tumores fibroides do septo nasal na leishmaniose.**—*Sciencia Medica.* 1925. Feb. 28. Vol. 3. No. 2. pp. 113–125. With 4 figs. [32 refs.]

A new type of lesion in cases of S. American leishmaniasis is described. It consists of a fibrotic nodule, painless and with little tendency to haemorrhage, which is fixed to the nasal septum by a broad base. That the nodule was actually due to leishmania appears to have been deduced from the fact that characteristic lesions occurred on other parts of the body. The differential diagnosis is discussed in detail. Treatment consists in removal of the growth by the galvanocautery.

C. M. W.

AIR MINISTRY. **Report on the Health of the Royal Air Force for the Year 1923.** [MUNRO (D.), Director of Med. Services, R.A.F.]. 1925. Feb. Air Publication 1103. [Oriental Sore. p. 68.]

An unsuccessful attempt was made to transmit oriental sore by means of *Phlebotomus papatasii* bred in England. A number of flies were fed on two sores, one of which was of the non-ulcerating variety and the other ulcerating. The flies were then allowed to feed daily for sixteen days on two non-immunes and for seventeen days on a third. During a year's observation there were no signs of infection.

C. M. W.

ATKINS (R. R. G.). **Some Observations on Oriental Sore.**—*Jl. Roy. Army Med. Corps.* 1925. Mar. Vol. 44. No. 3. pp. 213–215.

From experiences with the treatment of oriental sore in Mesopotamia the author believes that X-ray treatment with zinc ionization gives better results than any other. A tube of a penetration equal to four on Benoist scale, with a current of three M.A., was used over a filter of leather a quarter of an inch thick.

C. M. W.

CASTELLANI (Aldo). **The Treatment of Oriental Sore by Means of Phosphorus.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 480–481. [2 refs.] [United Fruit Company, Boston, Mass.]

Since his last note on the subject (this *Bulletin*, Vol. 20: p. 874) three further cases of oriental sore have been treated by applications of B.P. phosphorus oil or actual injections into the skin round the sore. Healing takes place in from 3 weeks to 3 months.

C. M. W.

D'Almeida (Carlos) & Rebêlo (Frederico). **Contribution à la thérapeutique des ulcères leismaniques.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 3. 3a. 4a. e 5a. Sessões.) 1923. Aug. No. 4. pp. 67–73.

It has been noted that oriental sore is by no means an uncommon disease in Angola. Various methods of treatment which have been tried are reviewed by the authors, who have found that intravenous injections of tartar emetic give the most satisfactory results. Intramuscular injections of the same drug also bring about a cure, but less rapidly. Local applications of Bouin's fluid, presumably accidentally applied in the first place, prove of great assistance in accelerating the healing process.

C. M. W.

Sharp (N. A. Dyce). **Oriental Sore in Nigeria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Nov. 20 & Dec. 11. Vol. 18. Nos. 5 & 6, p. 336.

A record of a case of oriental sore in Kaduna. Treatment with intravenous tartar emetic did not bring about a cure. After five weeks, when 15 grains had been injected, the treatment was abandoned. Tartar emetic ointment (10 per cent) was then applied for half an hour. It caused much pain, for which morphia was given. The ointment was then removed with castor oil. The sore healed in eleven days.

C. M. W.

Moschkowsky (Sch.). **Ueber die Einwirkung von Germanin ("Bayer 205") auf Leishmanien.** [The Action of "Bayer 205" on Leishmania.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Feb. Vol. 29. No. 1. pp. 40–44. [9 refs.]

A number of cases of oriental sore of Turkestan origin were treated with "Bayer 205" injected either intravenously, or into the tissues round the sore. In no case was any improvement noted. A case of infantile kala azar similarly failed to respond to the drug injected intravenously. It was also noted that the drug had no influence on the cultural forms of *Leishmania tropica* when tested *in vitro*.

C. M. W.

Dostrowsky (A.). **Ueber einen neuen endemischen Leishmaniaherd in Palästina.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Mar. 1. Vol. 29. No. 3. pp. 101–111. With 4 text figs. [11 refs.]

Abraham (J. Johnston). **Oriental Sore in a New Centre in Palestine.** [Correspondence.]—*Lancet.* 1925. May 30. pp. 1161–1162.

The author has discovered an endemic centre of oriental sore in Palestine, at Artuf, a village through which the old Turkish Jaffa-Jerusalem railway passed. He discusses various problems relating to the disease without producing anything really new. He mentions the case of a child from Baghdad who had 158 sores on the face and limbs.

Abraham, referring to the focus at Artuf, believes that during the war the disease was introduced by the Egyptian labourers who were provided with camps in and around the village.

C. M. W.

Neveu-Lemaire. **Observation clinique de boutons d'Orient multiples.**—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 44–47. [2 refs.]

This is a record of a case of oriental sore in which the patient developed multiple sores after being badly bitten by what appeared to be sand flies in Aleppo. It is usually stated in the text-books that the initial lesion resembles an insect bite, but the author thinks it would be more accurate to state that the initial lesion always commences at the site of an insect bite. The first lesions considered as oriental sores appeared in the case described after an incubation period of eighteen days. Subsequently other sores developed till a total of fifteen were present.

C. M. W.

i. de Buen (Sadi). **El kala-azar infantil. Instrucciones para su diagnóstico y tratamiento.** 2ª edición.—Ministerio de la Gobernación Publicaciones de la Dirección general de Sanidad. Madrid. 8 pp. With 5 figs.

ii. Timpano (Pietro). **Un caso di Kala-Azar in una donna di 23 anni.**—*Policlinico.* Sez. Prat. 1925. Apr. 13. Vol. 32. No. 15. pp. 526–527. [13 refs.]

iii. Mallardi (Mario). **Ancora sulla leishmaniosi infantile in provincia di Bari.**—*Pediatria.* 1925. Apr. 1. Vol. 33. No. 7. pp. 383–384.

iv. Wollstein (Martha). **A Case of Kala-Azar in an Infant.**—*New York State Jl. of Med.* 1925. Mar. 13. Vol. 25. No. 9. pp. 413–417. With 5 text figs. [18 refs.]

v. Furumori (Kamehira). [**On a Case of Kala-Azar occurring in Tokyo.**]—*Chugwai Iji Shimpo (Central Med. Jl.).* 1925. Jan. Vol. 44. No. 2. [Summarized in *Japan Med. World.* 1925. Mar. 15. Vol. 5. No. 3. p. 66.]

vi. Chatterjee (Anukul Chandra). **The Race, Class, Sex and Age Incidence of Kala-Azar.**—*Indian Med. Rec.* 1925. May. Vol. 45. No. 5. pp. 129–132.

vii. Ghosh (N. L.). **A New Factor in the Control of Kala-Azar.**—*Ibid.* 1925. Jan. Vol. 45. No. 1. pp. 4–6.

viii. Cannata (S.). **Contributo alla terapia della leishmaniosi infantile.**—*Pediatria.* 1925. May 1. Vol. 33. No. 9. pp. 449–452. [1 ref.]

ix. Gallo (Carmine). **Ricerche sul contenuto in ferro del sangue nelle anemie spleniche e nella leishmaniosi infantile.**—*Ibid.* 1925. Mar. 1. Vol. 33. No. 5. pp. 251–256. [13 refs.]

i. The author, who has had experience of kala azar in Spain (this *Bulletin*, Vol. 20, p. 568), has written this little pamphlet in which he outlines the symptoms, distribution, methods of diagnosis and treatment of the disease. About 100 cases have so far been diagnosed in the country.

ii. A record of a case of kala azar in a woman 23 years of age in Reggio, in Southern Italy. Treatment with tartar emetic was successfully carried out.

iii. A record of four further cases of infantile kala azar in Italy.

iv. A case of kala azar in an infant who had come to New York from Palermo, in Sicily. Treatment with tartar emetic was instituted, but the child died from septicaemia following noma.

v. A case of kala azar in a woman in Tokyo who had contracted the disease in Pekin.

vi. In the author's experience of kala azar in certain villages of Bengal race, sex and station in life have no bearing on the incidence of the disease. The majority of patients are between 5 and 15 years of age. Though cases in children under one year of age have been reported, the author himself has not met with any.

vii. The author points out that treatment of all cases of kala azar in an infected village or locality is a sure method of exterminating the disease, for antimony treatment, even if it fails to cure every case, renders them non-infective to others.

viii. The treatment of cases of infantile kala azar in Messina has shown that certain cases which appeared to be resistant to potassium antimony tartrate responded readily when the sodium salt was substituted.

ix. An examination in Italy of the iron content of the blood in 12 cases of infantile kala azar, 10 cases of splenic anaemia and 4 healthy children gave the following results in parts per thousand :—kala azar 0·06–0·36, splenic anaemia 0·30–0·46, healthy controls 0·35–0·55.

C. M. W.

i. DE MELLO (Froilano), REBELLO (Frederico) & PAES (Santana). **Sur quelques cas de leishmaniose cutanée observés à Mossâmedes.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 419–423.

——, PINTO (J. Ferreira), REBELLO (Frederico) & PAES (Santana). **Nouvelle iconographie sur la leishmaniose cutanée à Angola.**—*Ibid.* pp. 425–428. With 3 plates.

ii. MONTPELLIER (J.). **"Clou de Biskra" observé dans les environs d'Alger.**—*Bull. Soc. Path. Exot.* 1925. Mar. 11. Vol. 18. No. 3. pp. 249–251. [1 ref.]

iii. CÉARD (L.). **Existence du bouton d'Orient dans le Sahara Oranais.**—*Ibid.* 1924. Dec. 10. Vol. 17. No. 10. pp. 886–887. [1 ref.]

iv. LEBLANC (L.). **Existence du bouton d'Orient à Figuig (Maroc Oriental).**—*Ibid.* 1925. Feb. 11. Vol. 18. No. 2. pp. 146–148. [2 refs.]

v. BASU (D. N.). **An Interesting Case of Oriental Sore.**—*Indian Med. Gaz.* 1925. Apr. Vol. 60. No. 4. pp. 166–167. With 1 text fig.

i. In these two papers the author calls attention to the existence of oriental sore in Angola, cases having been discovered in Mossamedes, Benguella and Lobito.

ii. A description of a case of oriental sore in a youth who had lived on the Algerian littoral. Another similar case is mentioned in a footnote. These two cases are the 13th and 14th to be recorded from the districts of Algeria outside the well-known endemic zone of the Sahara.

iii. A case of oriental sore has been seen in the South Oranais district of Algeria, showing that the endemic focus of the disease extends towards Morocco.

iv. The discovery of three cases of oriental sore in Figuig combined with the previous observations at Bôu-Anane shows that an endemic centre of the disease exists in a district 800 kilometres to the south-west of Biskra.

v. Record of a case of oriental sore in a child in Calcutta, the infection having taken place during a visit to the Punjab six and a half to seven months before the commencement of the disease.

C. M. W.

RABIES: A REVIEW OF RECENT ARTICLES. III.*

In reviewing the literature on Rabies which has been published during the last six months we note with satisfaction that the trend of expert opinion is slowly but steadily turning away from methods involving the injection of large quantities of nerve material, and is gradually being focussed upon dilution methods, in particular upon those which have been carbolized. The reason for this movement is an increasing realization that "accidents paralytiques" are preventible occurrences which have become too obtrusive in institutes that have to deal with large numbers of patients. It is impossible, for example, to remain unimpressed by the fact that in one institute over a period of nine years there occurred no less than thirty-nine cases, in eight of which a fatal issue ensued. KORITSCHONER and SCHWEINBURG[1] have described these cases in detail, and have submitted them to a rigorous analysis. SCHWEINBURG now gives fuller details of the experiments which were referred to in the last summary (*ante* p. 249). He proves conclusively that paralytic accidents are a function of the quantity of nerve substance administered, and that they occur as frequently with normal as with rabid brain substance. HERMANN[2] from various experiments concludes in favour of a carbolized virus. KARLOWSKI[3] in Warsaw, and TRON[4] in Milan contrast statistics, and decide in favour of a similar method of treatment. It must be remembered that with the advent of treatment by carbolized vaccines there must follow, in all temperate climates at least, the dispatch of vaccine to general practitioners and the decline of Pasteur Institutes as centres for treatment. In other words, rabies vaccine will be prepared and issued just as bacterial vaccines are prepared and issued. HERMANN draws attention to this, KARLOWSKI is prepared to issue the vaccine, and in India, where such vaccines have been in use for many years, experiments (unpublished) are being carried out by STEVENSON and KING on the effects of tropical temperatures upon antigenic value.

The Virus.—CORNWALL[5] discusses the significance of appearances which he has noted in the Negri body. He believes that the great majority of these bodies are the expression of the intracellular growth of a specific organism. He ascribes the course of infection of the cell to the entrance of a small "spore," which increases to visible dimensions and is recognised as a small Negri body. Under favourable circumstances these increase still further and develop vaccuoles in each of which may be seen a darkly stained "corpuscle" of varying

* For the second of this series see *ante*, pp. 242–251.

1 KORITSCHONER (Robert) & SCHWEINBURG (Fritz). Klinische und experimentelle Beobachtungen ueber Lahmungen nach Wutschutzimpfung.—*Ztschr. f. Immunitatsf. u. Experim. Therap.* 1925. Mar. 2. Vol. 42. No. 3–4. pp. 217–283. [82 refs.]

2 HERRMANN (Otto). Immunisation gegen Tollwut mit verschiedenen Vakzinen.—*Cent. f. Bakt.* I. Abt. Orig. 1925. Mar. 10. Vol. 94. No. 5. pp. 296–303. [12 refs.]

3 KARLOWSKI (Z.) [In Polish.] Szczepionki przeciwko wściekliźnie. Les vaccins contre la rage.—*Medycyna Deświadczalna i Społeczna.* Warsaw. 1925. Jan.-Feb. Vol. 4. No. 1–2. pp. 139–159. With 1 text fig. [29 refs.]

4 TRON (Giorgio). I nuovi metodi di vaccinazione antirabica.—*Terapia.* 1925. Jan. Vol. 15. No. 67. pp. 1–11. [20 refs.]

5 CORNWALL (J. W.) On Negri Bodies.—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 601–603. With 2 plates. [9 refs.]

form. The body becomes filled with ripe corpuscles, and he believes that he has observed a splitting of the capsule, and the emergence of the corpuscles into the cytoplasm of the nerve cell. Photographs are reproduced showing this rupture. PANISSET and VERGE[6] also discuss the work of LEVADITI, MANOUELIAN and VIALA, and conclude that recent researches appear to show that it is " plausible " that the agent of rabies is protozoal (microsporidial) in character.

Deterioration and Preservation of the Virus.—The statement of REMLINGER that at the end of the 2,200th passage the Tangier strain of fixed virus is less resistant, and not only attenuates more rapidly on desiccation, but also when preserved in glycerine, is discussed by BURNET[7, 8] and PLANTUREUX[9, 10]. BURNET has noted no deterioration in the Tunis strain which was obtained from Paris 38 years previously. His rabbits die on the 7th to 8th day. Nor has he noticed any reduction in its keeping properties in glycerine, the period of its infectivity being greater than twenty days. PLANTUREUX found that infective properties were retained after eleven to thirteen days. He concludes from his experiment that the best preservative is Legroux's glycerinated formol serum, in which the virus remains virulent up to twenty days. This medium is prepared as follows. A mixture of 1 cc. of formaline in 600 cc. of serum is prepared, and shaken thoroughly. To this mixture are added 1,200 cc. aq. dest. and 450 cc. glycerine. The mixture is again shaken and sterilized at 110° C. in the autoclave. REMLINGER and BAILLY,[11] on the other hand, believe that glycerine is superior to glycerinated formol serum, as with the latter they obtained irregular results, accompanied in some cases by contamination.

MARIE[12] has found that the infective properties of fixed virus are destroyed when a 1 per cent. emulsion is placed for some hours at 30° C. in contact with an equal quantity of the filtrate of a culture of *B. subtilis*. When the filtrate had been previously heated to 100° C., the infective properties were not lost after similar treatment at a temperature of 38° C.

Virulence of Particular Strains.—REMLINGER[13] in an attempt to account for failures of treatment for which no obvious cause can be found, and for which, all too frequently, the burden of blame is laid

---

6 PANISSET (L.) & VERGE (J.). Les recherches récentes sur la nature du virus rabique.—*Rev. Générale de Méd. Vétérinaire.* 1924. Dec. 15. Vol. 33. No. 396. pp. 682–685.

7 BURNET (Et.). Sur la conservation des moelles pour le traitement antirabique. —*Arch. Inst. Pasteur de Tunis.* 1925. Jan. Vol. 14. No. 1. pp. 83–89. [8 refs.]

8 BURNET (Et.). Sur la conservation des moelles pour le traitement antirabique. —*C.R. Soc. Biol.* 1925. Mar. 7. Vol. 92. No. 8. pp. 562–563.

9 PLANTUREUX (Edm.). Influence de la dessiccation, de la température et de la glycérine sur un virus rabique fixe au 1.5000e passage, conservations des moelles rabiques en sérum formolé.—*C.R. Soc. Biol.* 1925. Feb. 6. Vol. 92. No. 4. pp. 253–254. [3 refs.]

10 PLANTUREUX (Edm.). Conservation des moelles rabiques en sérum formolé glycérine et en sérum phéniqué.—*C.R. Soc. Biol.* 1925. May 15. Vol. 92. No. 16. pp. 1292–1293. [4 refs.]

11 REMLINGER (P.) & BAILLY (J.). Le sérum formolé ne peut pas remplacer la glycérine pour la conservation du virus rabique.—*C.R. Soc. Biol.* 1925. May 8. Vol. 92. No. 15. pp. 1196–1198. [3 refs.]

12 MARIE (A. C.). Virus rabique et *Bacillus subtilis*.—*C.R. Soc. Biol.* 1925. Mar. 7. Vol. 92. No. 8. pp. 561–562. [3 refs.]

13 REMLINGER (P.). Les virus rabiques renforcés peuvent-ils rendre compte de certains échecs du traitement pasteurien ?—*C.R. Soc. Biol.* 1925. Mar. 13. Vol. 92. No. 9. pp. 681–682. [2 refs.]

upon the virulence of the infecting strain, has compared the virulence for guineapigs of two strains of street virus which differed widely in their virulence for rabbits. The result was as follows :—

Virus of normal virulence for rabbit (Killed 1st subpassage 14th day)—
20 vaccinated. 5 died. Mean time to death, 18 days.
10 controls. 8 died. Mean time to death, 18 days.
Virus of high virulence for rabbits (Killed 1st subpassage 8th day)—
20 vaccinated. 6 died. Mean time to death, 15 days.
10 controls. 8 died. Mean time to death, 12 days.

The forty vaccinated guineapigs had been treated with an ether virus, each animal receiving 20 cc. of brain emulsion. It would appear that there is no relation between virulence towards rabbit and virulence towards guineapig. This, he claims, is in accordance with BABES' results, which showed that whilst wolf virus is highly virulent for man, when injected into rabbits it leads to a prolonged incubation period (20–24 days). In this connection also ROCHAIX[14] describes a case in which the patient was bitten deeply in the hand by a cat. Treatment was commenced on the following day ; one year later the patient, after preliminary pleuro-pneumonic symptoms, died of typical hydrophobia. An emulsion of medulla of the patient was inoculated into the muscles of the necks of three guineapigs (two of which died on the 18th day and one on the 24th), and subdurally into a rabbit which died of dumb rabies on the 14th day. There was thus no evidence of attenuation of the virus. ROCHAIX finds an explanation in a former statement by REMLINGER that the virus may remain latent in the nerve centres for long periods of time, and may be brought into activity by secondary influences such as trauma, cephalitis, emotion, or, as occurred in the case which he is discussing, local cold (leading presumably to the pleuro-pneumonic symptoms described). REMLINGER, on the other hand, uses ROCHAIX's case to substantiate his argument that the virulence of a strain towards one species of animal may be independent of its virulence towards another. REMLINGER's results as published are quite insufficient to decide the matter. If incubation period is the criterion of virulence, then one might retort that in his " normal " series there is no evidence that the previous treatment by ether vaccine was of any value whatsoever ; if, as is more proper, the percentage mortality is taken as the criterion of virulence, then he has furnished only one figure regarding the percentage mortality for the rabbit ; that is to say, he has no adequate basis of comparison.

Virulence of Blood and Cerebrospinal Fluid.—HERRMANN[15] has found that the virus may be present in the blood not only of experimental animals but of those naturally infected. In one case he obtained a positive result from the serum of the heart blood of a woman who had died of the disease. The period of incubation in a rabbit was 245 days, as compared with 27 and 63 days in rabbits inoculated with an emulsion of the brain of the same patient.

He has also conducted experiments[16] on the transmission of the virus through the placenta. After the death from rabies of a guineapig

14 ROCHAIX (A.). Sur un cas de rage à incubation prolongée.—*C.R. Soc. Biol.* 1924. Dec. 5. Vol. 91. No. 34. pp. 1217–1218. [1 ref.]

15 HERRMANN (Otto). Die Ansteckungsfähigkeit des Blutes bei Lyssa humana.—*Cent. f. Bakt.* 1. Abt. Orig. 1925. Feb. 18. Vol. 94. No. 3–4. pp. 201–204. [9 refs.]

16 HERRMANN (Otto). Die Vererbung der Wut durch die Plazenta.—*Cent. f. Bakt.* 1. Abt. Orig. 1925. Jan. 20. Vol. 94. No. 1. pp. 42–45. [8 refs.]

infected with street virus, a foetus was found *in utero*. The brain of this foetus was tested by intracerebral inoculation into three guineapigs. One died from the operation, the other two contracted the disease after eight and eleven days respectively. He finds that if a birth occurs either during the course of the disease or within the period of nine to eleven days prior to the onset of symptoms the offspring is affected, whereas if the period is as long as twenty days there is no transmission.

GÉRARD[17] reports the development of rabies in a guineapig inoculated with the cerebrospinal fluid of a patient suffering from the disease.

Virulence of Saliva.—From a further series of experiments HERRMANN[18] concludes that the saliva of patients who have died of rabies is probably always infective. In order to demonstrate this fact it is necessary to use fresh saliva, and to observe the inoculated animal over a lengthy period.

Symptoms.—CORNWALL[19] confirms a previous finding (*Indian Journal Med. Res.*, VII, No. 1, p. 148), that a rise in blood sugar supervenes upon subdural inoculation of fixed virus into rabbits. This increase is a terminal phenomenon.

Diagnosis.—A new method of staining Negri bodies is presented by EPSTEIN[20]. After fixation in methyl alcohol or acetone, and cutting in paraffin, the sections are subjected to the following procedure :—

1. Placed in 5 per cent. Tannic Acid for 15 minutes at room temperature.
2. Stained in 1 to 5 per cent. Fuchsin S. (in 3 per cent. Anilin water) over a weak flame until steam rises, then washed.
3. Placed in 0·3 to 0·5 per cent. Thionin (in aq. dest.) for 10 to 15 seconds until section becomes dark blue-violet, then washed.
4. Placed in 10 per cent. Aurantia (in 70 per cent. alcohol) for 5 to 10 seconds until section is the colour of tobacco.
5. Absolute alcohol for 3 to 5 seconds until section appears green.
6. Finally, in xylol or toluol, where the tissue becomes transparent, and of a light yellow colour.

[N.B.—The aurantia must be the red brown crystalline powder manufactured by Grübler and others, and not the light gold amorphous powder which is frequently sold.]

By this method the protoplasm is stained light greenish yellow, the nuclei blue, the erythrocytes appear vermillion in colour, the Negri bodies are rose to purple red, whilst the nucleoli are grey to black violet. Accordingly Negri bodies are sharply distinguishable from the nucleoli of the ganglion cells.

Canine Rabies in Africa.—Canine rabies has been described by Dr. BOYÉ as occurring in the middle Congo region; BLANCHARD and

---

17 GÉRARD (F.). [A Fatal Case of Hydrophobia.].—*Rev. Tunisienne des Sci. Méd. et Tunis Médical réunis.* 1924. Aug. [Summarized in *Brit. Med. Jl.* (Epitome of Current Medical Literature.) 1924. Dec. 20. p. 89.]

18 HERRMANN (Otto). Virulenz des Speichels des lyssa-kranken Menschen und Einfluss anderer Krankheiten auf den Verlauf der Tollwut.—*Cent. f. Bakt.* 1. Abt. Orig. 1925. May 15. Vol. 95. No. 1. pp. 67–69. [6 refs.]

19 CORNWALL (J. W.). Estimation of Blood Sugar in Normal Rabbits and in Rabbits inoculated subdurally with Rabies Fixed Virus.—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 581–582. With 1 fig. [1 ref.]

20 EPSTEIN (H.). Beitrag zur zytologischen Diagnose der Lyssa.—*Cent. f. Bakt.* 1. Abt. Orig. 1924. June 16. Vol. 92. No. 1–2. pp. 71–72. [3 refs.]

Lefrou report cases from Brazzaville. Repetto[21] now describes two cases which he has observed in the Lower Congo. In the brains of each of these, Negri bodies were found, but owing to faulty technique confirmation by the animal test failed.

Statistics of Treatment.—Fananás[22] publishes the statistics of the National Institute of Hygiene in Madrid. During the years 1922 and 1923, 2,661 persons were treated, of whom 2,037 were bitten by dogs. One death occurred, *i.e.*, a mortality of 0·037 per cent. The treatment was by the method of Högyes.

Statistics from Lemburg are presented by Gasiorowski and Meisel[23]. During the three years 1921–1923, 5,830 persons were treated by dried cords (1 to 4 days dried, and thereafter preserved in 50 per cent. glycerine). Of these 12 died, 8 either during or within 14 days after completion of treatment. The failures were thus 4, or 0·064 per cent. Three cases of paralytic accident occurred; two involved mainly the facial nerve, and one was a transverse myelitis.

Karlowski[3] furnishes statistics from Warsaw. After a lengthy summary of the relative advantages of the various methods of treatment he decides in favour of a carbolized vaccine. He gives the following figures:—

Persons arriving within 1st week 32,999; of whom 130 died: rate 0·39 %
" " " 2–4th " 6,122; " " 25 died: rate 0·40 %
" " later than 4th week 300; " " 6 died: rate 2·0 %

Yeguchi[24] reports upon the results of treatment in the Dairen Hospital (Manchuria). In all, 452 cases have been treated during the period of eight years ending 1916. The vaccine employed was at first 1–7 day dried cords; this has now been altered to 1–5 day dried cords. The vaccine has been distributed for the treatment of 249 other patients in surrounding places. There have been no untoward effects.

Prophylactic Vaccination of Dogs.—The number of papers published gives evidence of the interest which has been aroused in this direction as a result of the Japanese experience. Most of these communications discuss in detail the historical evolution of the method, and are in this sense general in character. Kraus[25] recommends for Vienna a voluntary system of dog inoculation, and suggests as an incentive that dogs treated in this manner should be exempted from tax. After a

21 Repetto (R.). Quelques cas de rage canine au Bas-Congo.—*Revista Méd. de Angola.* (No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 5. 9a. 10a. e Sessão de encerramento.) 1923. Aug. No. 4. pp. 111–114. [2 refs.]

22 Ramón y Fananás (J.). Estadística de los cacos tratados por el método antirrábico de Högyes en el Instituto Nacional de Higiene de Alfonso XIII durante los años 1922–1923.—*Arch. Inst. Nac. Higiene de Alfonso XIII.* 1924. Oct. Vol. 3. No. 3. pp. 125–129.

23 Gasiorowski (N.) & Meisel (H.). Stacja Pasteurowska we Lwowie w okresie 1919–1923. Die Pasteursche Station in Lemberg in den Jahren 1919–1923.—*Medycyna Doświadczalna i Społeczna.* Warsaw. 1924. Vol. 3. No. 5–6. pp. 436–452. German summary pp. 448–449. With 1 fig. [10 refs.]

24 Yeguchi (Churoku). [On the Antirabic Inoculation.]—*Namman Igakkai Zasshi* (*Jl. of South Manchuria Med. Soc*). 1924. Apr. Vol. 12. No. 6. [Summarized in *Japan Med. World.* 1924. Nov. 15. Vol. 4. No. 11. p. 294.]

25 Kraus (R.). Vorschläge zur Schutzimpfung gegen Hundswut.—*Seuchenbekämpfung.* 1925. Vol. 2. No. 1–2. pp. 71–74.

few years, if satisfactory results are obtained, vaccination might be made obligatory. PUNTONI[26] believes that prophylactic vaccination of dogs is a good coadjuvant, but insists that other methods of dog control should not be neglected. MURILLO[27] has used Umeno and Doi's method over a period of six months. He does not state how many dogs were dealt with, but all apparently remained in health. EICHHORN[28] and MOORE[29] present the subject as a basis for discussion at a meeting of American Veterinarians.

Methods of Treatment.—KRAUS[30] recommends Calmette's method of storage of dried cords in glycerine for institutes which have to deal with a comparatively small number of patients. The cords of different ages are stored in glycerine and kept in the ice chest. He dispatches to general practitioners tubes each containing a piece of dried cord in glycerine. This has to be emulsified by the administrator. Eight hundred persons have been treated in this way without any local or general accidents, and, in particular, no accidental paralyses have been observed. [As these are to be expected approximately only once in 2,000 times, this is not remarkable.] KRAUS concludes that " perhaps HARRIS's dried and powdered vaccine would be better."

HERRMANN[2] finds that the duration of treatment is more important than the quantity of material introduced. Also that the mere additon of carbolic acid to a vaccine which has been killed by heat does not reduce its immunizing properties. He advocates exposure for half an hour at 58–60° C., with addition subsequently of carbolic acid to ½ per cent.

REMLINGER[31] recommends the use of etherized vaccines for the treatment of dogs and cats. Brains are placed in ether for 25, 20, and 15 hours respectively. The ether is removed, and the tissue emulsified in 50 cc. of sterile saline, strained through muslin, and injected under the skin. A dose of one brain is administered on three occasions with intervals of either one or two days. Perhaps three inoculations are unnecessary; perhaps the period of action of the ether may be altered. Excellent results have been obtained with dog and cat, both prophylactically and curatively. These will be published at a later date.

The period of Infectivity of the Saliva of the Biting Animal.—Four papers have been communicated regarding the period of time prior to the development of symptoms during which the saliva of the biting animal may be infective. The question has an important application. REMLINGER does not treat persons bitten if the dog is alive and well fifteen days after biting. The Indian Pasteur Institutes have shortened the period to ten days, and in all Pasteur Institutes a rule

---

26 PUNTONI (Vittorio). Sulla vaccinazione antirabica preventiva dei cani.—*La Clin. Vet.* 1924. Nov. Vol. 47. No. 11. pp. 637–643.

27 MURILLO (Gerardo Agustín). La rabia canina. Vacunación antirrábica por el método Umeno.—*Rev. Hig. y Sanidad Pecuarias.* 1925. Apr. Vol. 15. No. 4. pp. 244–245.

28 EICHHORN (A.). Discussion on Rabies.—*Cornell Veterinarian.* 1925. Apr. Vol. 15. No. 2. pp. 227–229.

29 MOORE (Veranus A.). Rabies and its Control.—*Cornell Veterinarian.* 1925. Apr. Vol. 15. No. 2. pp. 217–226. [15 refs.]

30 KRAUS (R.). Ueber eine ökonomische Methode der Schutzimpfung gegen Hundswut.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1. Teil. Orig. 1924. Aug. 27. Vol. 41. No. 1. pp. 92–96. With 1 text fig.

31 REMLINGER (P.). Vaccination du chien et du chat contre la rage au moyen du virus-éther.—*C. R. Soc. Biol.* 1925. May 8. Vol. 92. No. 15. pp. 1195–1196.

of this sort is acted upon. It must be remembered at the outset that a large number of patients have been dealt with on this basis, all over the world and throughout the past forty years. It will be admitted that a death from rabies amongst this group would not escape recognition and report. The procedure agreed upon thus rests upon a vast body of statistical experience; and in no case, so far as we are aware, has a death from rabies occurred. The reviewer would suggest to directors of Pasteur Institutes that figures relating to this point would be valuable, and should be published.

We now turn to four papers which deal with this point. The first, by PANISSET and VERGE,[32] discusses the question from a general point of view. In the second, DE MELLO,[33] after a long introduction, bearing on previous findings, reports the case of a dog, the details of which are as follows:—

10.12.23: bit two children.
24.12.23: bit a little girl.
Five or six days later: bit a cow.
4.1.24: bit father of little girl.

From 11.1.24 was carefully watched for a week, during which period it also bit a passer-by. It became "ennuyeux" and was killed.

The little girl bitten on 24.12.23 developed rabies and died on the 25.2.24. The only symptom apparent in the dog was a tendency to biting.

RAHMET BEY[34] describes a case in which a boy developed rabies fifty-one days after being bitten; the dog was seen to be alive and well thirty-three days after it inflicted the bite.

HERRMANN[35] draws attention to a third case, in which a dog bit a calf early in August, 1924. About two weeks later (15.8.24) it bit two persons; on 23.9.24 it bit a woman; on 7.10.24 it bit a further person after having been ill for five days. It died of rabies on 10.10.24. The calf died of rabies in October, and one of those bitten on 15.8.24 developed rabies and died on 10.10.24.

It would appear that the period of infectiveness of the saliva had been prolonged to twenty-six days in DE MELLO's case, to at least thirty-three days in that of RAHMET BEY, and to seventy days in the case described by HERRMANN.

The problem is associated with the vexed question of recovery from rabies, and of periodic rabies (*lyssa recurrens*). This latter condition has been described by THEVENOT, by LÖTE and by KONRADI. HERRMANN[35] goes on to examine the condition experimentally. He claims, basing his conclusions upon slight variations of body temperature and of weight, that it can be produced in animals either by the use of weak viruses, or in animals whose resistance has been raised by previous vaccination. He also considers that it occurs under natural conditions comparatively frequently. It is always difficult to estimate the value

32 PANISSET (L.) & VERGE (J.). La durée de la période d'observation des animaux "mordeurs".—*Rev. Générale de Méd. Vétérinaire*. 1925. Mar. 15. Vol. 34. No. 399. pp. 173–176. [21 refs.]

33 DE MELLO (Froilano). Sur la durée de surveillance des chiens mordeurs pour dépister la rage canine.—*Bol. Ger. Med. e Farmacia*. Bastora. 1924. June. 9th Ser. No. 6. pp. 239–246.

34 RAHMET BEY (H.). Hydrophobia and Carriers.—*Med. Jl. & Record*. 1924. Dec. 17. pp. 591–595. [1 ref.]

35 HERRMANN (Otto). Experimentelle und natürliche Lyssa recurrens.—*Cent. f. Bakt.* I. Abt. Orig. 1925. May 15. Vol. 95. No. 1. pp. 69–74. [8 refs.]

of evidence taken from individual cases such as those of DE MELLO, RAHMET BEY, and HERRMANN. With regard to the experimental work of HERRMANN it is to be noted that he observed similar periodic variation after inoculation with cholera vaccine.[36]

Accidents during the Course of Treatment.—IONESCO[37] and HERRMANN[36] draw attention to anaphylactic symptoms arising as a result of treatment. The former describes a case in which these took the form of a micro-papulo-vesicular eruption with marked eosinophilia. The latter, to subcutaneous infiltrations probably due to contamination in the vaccine administered. He finds that anaphylactic symptoms do not occur after the administration of a carbolized vaccine.

PAMBOUKIS[38] describes two cases of paralytic accidents, and KORITSCHONER and SCHWEINBURG,[1] in the paper to which we have already referred, describe in detail thirty-nine cases.

AVEZZU[39] describes a case in which trigeminal and facial symptoms prevailed.

In all these cases the reason is not far to seek. The reviewer may be permitted to express the pious hope that in the near future these occurrences will have only an historic interest, for with the adoption of more rational methods of treatment they will cease to occur.

Miscellaneous.—SATOMI, MIURA, and HIRAKAWA[40] tested fourteen pigments, and found that three of these : " thiobenzenyl, oxazin, and nitro pigments had postponed the development of symptoms a little longer than the controls."

LIN[41] after a general discussion on rabies pleads for more active realization of the dangers of rabies in China, and for preventive action against the spread of the disease.

A. G. McKendrick.

---

36 HERRMANN (Otto). Anaphylaxie bei antirabischen und anderen Impfungen. —*Cent. f. Bakt.* 1. Abt. Orig. 1925. Mar. 10. Vol. 94. No. 5. pp. 290–296. [8 refs.]

37 IONESCO (Dimitrie). Eruption micro-papulo vésiculeuse généralisée pendant le traitement antirabique.—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1925. Jan. Vol. 7. No. 1. pp. 14–15.

38 PAMBOUKIS. Sur quelques lesions du système nerveux provoquées par les injections antirabiques.—*Grèce Méd.* 1924. Dec. Vol. 26. No. 12. pp. 93–94.

39 AVEZZU (Guido). Le paralisi da trattamento antirabico.—*Gazz. d. Ospedali.* 1923. Vol. 44. No. 54. pp. 632–634. [27 refs.]

40 SATOMI (Mitsuwo), MIURA (Tsunesuke) & HIRAKAWA (Hiroshi). [On the Influence of Pigments against the Rabies Virus.]—*Nihon Biseibutsu Gakkwai Zasshi* (*Jl. Japan Microbiol. Soc.*). 1924. Sept. Vol. 18. No. 12. [Summarized in *Japan Med. World.* 1925. May 15. Vol. 5. No. 5. pp. 130–131.]

41 LIN (C. S.). Antirabic Measures and their Practical Application.—*Nat. Med. Jl. China.* 1924. Oct. Vol. 10. No. 5. pp. 319–326. With 4 figs. [2 refs.]

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

CHAPCHEFF (C.). **Les détails de la transmission de la fièvre récurrente européenne par les poux.**—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 97–105. Also [in Russian] in *Med. Practice* Kharkov. 1924. No. 1–2. 11 pp.

The author has worked in Russia with a strain of European relapsing fever [*S. recurrentis*] and first gives details of the examination of lice obtained from patients at different periods of the attack.

Spirochaetes were found in 13 out of 138 lice collected from patients between the 2nd and 18th day of the disease, head lice and body lice being equally infected. One of 14 *Phthirus pubis* taken from a patient between the 6th and 8th days of the fever showed spirochaetes in the stomach, but not in the haemolymph and other organs. 507 lice from healthy subjects in an uninfected locality were fed on patients in various stages of relapsing fever, and subsequently on two healthy subjects. The latter never became infected, although receiving more than 6,000 bites, a confirmation of previous observations [see this *Bulletin*, Vol. 1, p. 33] that the louse does not transmit the infection by its bite alone.

These lice were examined daily for the presence of spirochaetes, and the results fall into three groups :—

(1) Lice (115) fed during the non-febrile period between attacks never showed spirochaetes.

(2) Lice fed on patients during the first or second febrile attack, which subsequently showed spirochaetes in the haemolymph, or other parts of the body ; and

(3) Lice which, although fed two or three times on patients having spirochaetes in their blood, never showed any signs of the infection. These lice were all fed after the epidemic began to diminish in severity, and the author suggests that this inability to develop in the louse, as well as the disappearance of epidemics, is due to falling off in the infective power of the spirochaetes.

As regards (2), when lice were kept at 22°-25° C., spirochaetes ingested into the stomach became granular within 3 hours, and disappeared entirely within the first 24 hours. After a negative period of about 10 days, spirochaetes reappeared in the haemolymph, and were present throughout the remainder of the life of the insect.

For infection to be produced when an infected louse feeds, it is necessary for the haemolymph to get on to the skin of the subject, and the author points out that even the loss of a leg is quite enough to allow this escape.

In conclusion, the author discusses the relapsing fevers transmitted by ticks and is of the opinion that the louse, in comparison, is a comparatively recent host.

E. Hindle.

BLANCHARD (Maurice). **Les spirochétoses aiguës de l'Afrique Equatoriale Française.**—*Revista Méd. de Angola.* (No. especial 1° Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 259–272.

A summary of the various acute spirochaetal infections occurring in the French Congo.

Relapsing fever is the first to be considered, the species concerned being *Sp. duttoni*. The disease is transmitted by *Ornithodorus moubata*, which occurs in the Colony in considerable numbers. The method of triple centrifuging is recommended for the examination of the blood in suspected cases, as the parasites are often extremely rare and cannot be found by ordinary methods. The repeated trial of atoxyl as a medicament is suggested, as in one case accidentally treated by this compound the symptoms of the disease disappeared at once.

Spirochaetal jaundice is next considered, of which no less than 15 cases occurred in three months at the native hospital at Brazzaville. The clinical symptoms are said to closely resemble those of yellow fever in a certain number of cases. The spirochaetes were never observed by direct examination of the blood or urine, but only after triple centrifuging.

A guineapig was infected by inoculation of blood from one of the patients and died 25 days later with the usual symptoms. The virus was maintained through five guineapigs, after which it was lost through the recovery of the last of these animals.

Bed bugs (*Cimex lectularius*) collected from the beds occupied by the patients were ground up in saline and inoculated into a guineapig which died on the 11th day without showing any spirochaetes, but with intense jaundice. A guineapig inoculated from the first one died 25 days later and showed the typical Leptospira and jaundice. Stegomyia captured in the rooms occupied by the patients were also inoculated into guineapigs with negative results. Attempts were made to transmit the disease from infected to healthy guineapigs by the bites of bed-bugs, and the author again states that the bites of these insects were infective up to the 38th day after an infecting feed. [See this *Bulletin* (Bonne), Vol. 20, p. 139, and Vol. 22, p. 183.]

The third section is devoted to "Blackwater fever," which was exceptionally common at Brazzaville during 1922. In none of these cases was the author able to find the spirochaete originally described by himself and Lefrou as causative organism of this disease [see this *Bulletin*, Vol. 20, p. 142]. The theory is put forward that the "spirochaetal blackwater fever" only occurs in the region of the Congo known as "Le Couloir," and especially in the neighbourhood of the Rivière Noire and Léfini, as the author has never observed these spirochaetes in the blood of patients who had not been in these regions. Moreover, it is said to be very difficult, sometimes impossible, to distinguish between ordinary cases of blackwater and the spirochaetal variety, the distinction being made only by the discovery of the organism, for which triple centrifuging is necessary. If spirochaetes are present, the use of arsenicals or mercury is indicated.

A summary of the various characters of the acute spirochaetal infections of the French Congo is given in tabular form.

E. H.

Guillet (René). **Fièvre récurrente à Brazzaville.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 273–278. [3 refs.]

An account of an outbreak of 12 cases of "tick fever" among the native soldiers at Brazzaville. All showed a first attack of two or three days, followed in most cases by a disappearance of the fever, but two

or three showed relapses. Spirochaetes were observed in the blood of only one patient by direct examination, but in two others after centrifuging. *Ornithodorus moubata* was very common in the prison and police post, but not in the town, which explains why only males were attacked. Intravenous injections of 0·70-0·75 gms. of novarsenobenzol in most cases were curative after a fortnight, but patients who had shown oedema or jaundice required two or three months' recovery, during which continued injections seemed to have no effect.

E. H.

GRAHAM (J. D.). **La fièvre récurrente dans l'Inde Britannique.**—*Bull. Office Internat. d'Hyg. Publique.* 1925. Jan. Vol. 17. No. 1. pp. 23–30. [21 refs.].

In the north-west Punjab an epidemic of relapsing fever broke out during the winter of 1923 and continued until the summer of 1924, as shown in the following table :—

	1923.			1924.							
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Total.
Cases	124	266	383	1,302	724	5,022	5,277	3,323	2,894	299	16,614
Deaths	16	46	95	325	58	489	306	291	256	20	1,902

In addition to this epidemic, an earlier one occurred in the Province during 1923, with a record of 28,830 cases, with 7,568 deaths, but these figures are said to be unreliable, as plague and malaria were also present.

The United Provinces record 360 deaths from relapsing fever in 1922 and 250 in 1923.

Burma is said to be relatively free from the disease, but cases are sometimes imported, especially among the Chinese coolies.

Kashmir suffered from a severe epidemic in 1923–1924, which was supposed to be a mixture of relapsing fever and typhus, but its exact nature is still uncertain.

E. H.

RAJU (K. V.). **Notes on Some Cases of Relapsing Fever.**—*Indian Med. Gaz.* 1924. Dec. Vol. 59. No. 12. pp. 616-618. With 1 chart.

A description of the symptoms and treatment of 29 cases of relapsing fever admitted to the Railway Hospital, Hubli [Southern Bombay]. The number of spirochaetes in the blood is stated to be a rough guide to prognosis and no case with more than about 20 per field ever recovered. The intravenous injection of 0·45 gm. novo-arsenobenzol cuts short the pyrexial attack, and in the majority of cases cures the patient, but in a few cases there is a relapse, and then the apyrexial interval is always prolonged. In order to be certain of curing the disease it was found advisable to give a second injection of the same dose, about 5 days after the temperature had fallen. The temperature chart is given of an abnormal case of relapsing fever.

E. H.

HESSE (Erich). **Zur Kenntnis der chirurgischen Komplikationen und Nachkrankheiten des Fleckfiebers, Rückfallfiebers und des Paratyphus N. (Erzindjan), einer Mischinfektion des Recurrens.** [The Surgical Complications and After-Effects of Typhus, Relapsing Fever and of Paratyphoid N. (Erzindjan), a Mixed Infection of Relapsing Fever.]—*Arch. f. Klin. Chirurg.* 1924. Vol. 128. pp. 739–814. [Numerous refs. in footnotes.]

The monograph describes the surgical complications of typhus and relapsing fever and mixed infections of the latter and paratyphoid. During the years 1915-1923 the author has dealt with 406 such conditions, which are described in detail. It is evident that during this period, as a result of the economic changes which told hardly on the health of the population, the percentage of surgical complications of these diseases was considerably increased (see this *Bulletin*, Vol. 21, p. 729).

E. H.

COLLIER (W. A.). **Ueber Pathogenität und Virulenzänderungen verschiedener Rekurrensstämme für den Menschen.** [Changes in the Pathogenicity and Virulence of Various Strains of Relapsing Fever.]—*Deut. Med. Woch.* 1925. Jan. 23. Vol. 51. No. 4. pp. 137–138. [13 refs.]

The use of relapsing fever for the treatment of paralysis in various European hospitals has given opportunities of observing the virulence of different strains of this disease in man. The continued passage of relapsing fever spirochaetes through mice enhances their virulence for these animals, but, at the same time, destroys their virulence for other hosts. Two laboratory strains of European relapsing fever maintained in laboratory animals for some years at the Georg Speyer-Haus were found to have lost their virulence for man.

The author has experimented with a strain of African relapsing fever kept in mice for about twelve years. It had maintained its virulence for man and had also acquired resistance against salvarsan; after further passage through mice for a year it suddenly lost its virulence for man, though the same strain maintained in culture for the same period had retained its virulence. Moreover, both strains continued to be resistant against salvarsan.

E. H.

PLAUT (F.). **Ueber Rekurrensimpfung.** [Relapsing Fever Inoculations.]—*Deut. Med. Woch.* 1925. Mar. 6. Vol. 51. No. 10. pp. 387–388.

After referring to COLLIER'S observations [see above], the author describes his own experience with strains of relapsing fever employed in the treatment of paralytics. The Frankfurt strain of *S. recurrentis*, maintained for 10 years by passage through mice, had lost its virulence for man. A strain of *S. duttoni* that had been kept for 12 years at the Hamburg Tropical Institute was found to be losing its virulence for human beings, and was also resistant to salvarsan. Two months later, after passage through the intermediate

host (ticks), the spirochaetes recovered their virulence for man, but were still arsenic resistant. This strain has now been kept in mice for six years, except for two passages through man, and still remains virulent both for mice and man. Moreover, no change has been observed in its therapeutical utility.

E. H.

Schuster (Helene). **Anatomische Untersuchungen bei Recurrens im Kindesalter.** [Anatomical Investigations on Relapsing Fever in Childhood.]—*Beitr. z. path. Anat. u. z. allg. Path.* 1924. Vol. 72. pp. 669–686. [35 refs.]

The author describes the results of post-mortems on 29 children between the ages of 2 weeks and 11 years, who had died from relapsing fever in Lemberg. The disease is very dangerous to young children, and seems to be invariably fatal to those under one year of age, Inflammation of the lungs was observed in 50 per cent. of the cases and inflammation of the kidneys also in 50 per cent., these being the most prevalent complications.

E. H.

Tomioka (Y.). **Experimenteller Beitrag zur Frage der Immunität bei Recurrens und ihrer Beeinflussung durch die Salvarsantherapie.** [Observations on Immunity in Relapsing Fever and its Influence on Salvarsan Treatment.]—*Cent. f. Bakt.* 1. Abt. Orig. 1924. June 16. Vol. 92. No. 1-2. pp. 41–61.

An extension of the work of Buschke and Kroó [see this *Bulletin*, Vol. 21, p. 268], who were the first to show that in experimental infections of Russian relapsing fever the spirochaetes invade the brain substance and may remain there for some weeks after they have disappeared elsewhere. The author has employed a similar strain of spirochaetes, but used a "percutaneous" method of inoculation. Contrary to what one might have expected, animals thus infected showed a higher percentage of deaths, and also more relapses, than those infected sub-cutaneously or intra-peritoneally. With mice the mortality rate for the former was 70 per cent., as compared with 42 per cent. for the latter The method employed was to leave a drop of infected blood on the shaved belly of the mouse for about half an hour, and to wash it off after it had dried ; infection invariably succeeded.

A number of mice were infected and their brains examined for spirochaetes by inoculation into normal mice at varying intervals after the beginning of the infection ; up to 21 days after, the brains of all examined contained spirochaetes, but after 36 days only one out of five.

The effects of salvarsan treatment on the presence or absence of spirochaetes in the brain was very marked when a sufficiently large dose was given at an early stage of infection.

These results support the view that it is important to treat relapsing fevers, as well as syphilis, with massive doses as early as possible, in order to destroy the parasites before they have had time to invade the central nervous system and develop resistant forms. Buschke and Kroó's hypothesis that the presence of latent forms in the brain is linked up with immunity is thus discountenanced, since mice were

proved to be still immune against re-infection several weeks after the usual time of the disappearance of the infection from the brain. Moreover, animals that had been cured by early injections of neo-salvarsan were also immune against re-infection.

E. H.

KRANTZ (Walther). **Eine einfache Methode zur Konservierung von Rekurrensspirochäten.** [A Simple Method of preserving Relapsing Fever Spirochaetes.]—*Muench. Med. Woch.* 1925. Jan. 2. Vol. 72. No. 1. pp. 12–13.

The white of a hard-boiled egg is cut up into pieces about 0·5 to 1 cc. in size, which are distributed in 12 to 15 test-tubes. Each tube is then charged with 10-15 cc. of sterilized physiological salt solution, and after closing is placed in the steam sterilizer for one hour on two successive days. When 2 to 5 drops of blood containing the spirochaetes are added, the blood cells settle on to the coagulated albumen, and the spirochaetes remain in the liquid. The tubes are then kept in the ice-chest. The author found living and virulent spirochaetes of European relapsing fever four to six weeks after they had been introduced. The organisms do not seem to multiply in the tubes.

E. H.

ARISTOWSKY (W.) & HOELTZER (R.). **Ein neuer Nährboden zur Kultivierung der** *Spirochaete Obermeieri.* [A New Medium for the Cultivation of *S. obermeieri.*]—*Cent. f. Bakt.* 1 Abt. Orig. 1925. May 1. Vol. 94. No. 7/8. pp. 448–452.

A continuation of previous work by Aristowsky on the cultivation of *Spirochaeta obermeieri* [*recurrentis*]. The authors now recommend the following method, as better :—

A piece of brain of rabbit, or cattle brain (obtained at the butcher's), about 0·5-1 cm. in diameter, is dropped into a test-tube and covered with a few cc. of physiological saline. The tube is then sterilized in the autoclave for 15 minutes at 120° C. The saline is poured out, leaving the piece of sterile brain tissue, and now 8 cc. of fresh horse serum are added, followed by the liquid containing the spirochaetes. In the case of sub-cultures, about 0·5 to 1 cc. of the culture is used for inoculating the fresh tubes. Finally, a layer of paraffin oil is added and the tubes incubated at 35° C.

Spirochaeta recurrentis is said to grow very rapidly in this culture medium. Sub-cultures should be made every 48 hours, and the authors have found that after 60 passages the organism still retained its virulence, though it had already had 75 passages in Aristowsky's earlier culture medium (employing boiled albumen). After two or three days in the incubator the cultures may be kept at room temperature and the spirochaetes remain active for at least a fortnight.

The horse serum used for these cultures was obtained from horses that had not been fed overnight ; the blood was placed in the incubator for two hours and subsequently in the ice chest, and the serum removed as soon as it formed. The serum of some rare individuals is, however, unsuitable for the cultivation of spirochaetes. The layer of paraffin oil seems to act by preventing alterations in the alkalinity of the serum.

E. H.

BRUYNOGHE (R.) & DUBOIS (A.). **Action du radium sur le** *Treponema duttoni, in vitro.*—*C.R. Soc. Biol.* 1925. Feb. 20. Vol. 92. No. 6. p. 466. [1 ref.]

Spirochaetes (*S. duttoni*) were exposed to the action of the B and Y-rays for periods up to 47 hours, but although the incubation period of the infection, produced by the subsequent inoculation of these organisms into mice, was prolonged, the action of the rays was only feeble. Exposure to the emanations (5 millicuries) for 5 and 23 hours respectively destroyed the infective powers of the spirochaetes, although their motility was unaffected.

E. H.

DE MELLO (F.) & MESQUITA (B. P.). **Sur les spirochétoses intestinales humaines dans l'Inde Portugaise.**—*Bull. Soc. Path. Exot.* 1924. Dec. 10. Vol. 17. No. 10. pp. 857–861.

The authors examined for spirochaetes the faeces of 51 normal individuals who neither at the time of examination nor during the past six months had suffered from any intestinal troubles. The following tabulated results show no evidence of *Spirochaeta eurygyrata* possessing any pathological significance.

No spirochaetes observed	2 cases.
1-5 spirochaetes in each field of microscope ...	19 ,,
5-10 ,, ,, ,, ,, ...	8 ,,
10-15 ,, ,, ,, ,, ...	6 ,,
15-20 ,, ,, ,, ,, ...	6 ,,
20-50 ,, ,, ,, ,, ...	7 ,,
More than 50—often innumerable	3 ,,
Total of individuals examined	51 cases.

The faeces of patients suffering from various intestinal affections were also examined, and again no evidence was obtained of any connection between the pathological conditions and the presence or absence of spirochaetes. In all except two cases the species observed was *Spirochaeta eurygyrata* Werner 1909, *emend.* Fantham, 1916, and the characters of the organism are redescribed by the authors.

E. H.

DE MELLO (F.) & MESQUITA (B. P.). **Essais expérimentaux de traitement de la spirochétose humaine à** *Sp. eurygyrata,* **par quelques spirillicides modernes.**—*Bull. Soc. Path. Exot.* 1924. Dec. 10. Vol. 17. No. 10. pp. 861–863.

Intravenous injections and also enemata of neosalvarsan are found to have no effect on *S. eurygyrata,* and injections of the bismuth compounds Muthanol, Neotrépol and Trépol, and also Dermatol administered *per os,* three per diem, for six consecutive days, caused the spirochaetes to disappear from the faeces in three cases tried, and in two re-examined a month later they were still absent.

E. H.

HOFFMANN (W. H.). **Las enfermedades espiroquéticas consideradas desde el punto de vista inmunológico.** [Spirochaetal Diseases from the Immunological Aspect.]—*Siglo Méd.* 1923. 20 pp.

This article comprises a consideration of most of the spirochaetal diseases from the point of view of their immunity reactions, briefly

indicating how these may be made use of in diagnosis, treatment and prophylaxis. Thus, for diagnosis, the production of antibodies and the complement-fixation test are applicable. In relapsing fever antibodies are produced with fair rapidity so that the spirochaetes disappear from the blood, but only after a considerable period are these antibodies formed in quantity sufficient to destroy the organisms, hence the relapses. In syphilis, on the other hand, the immunity is due to incomplete cure, and when definite cure is brought about there is no longer any true immunity. As regards treatment the serum of convalescent patients or that of animals after inoculation may be used, as for example, in relapsing fever, Weil's disease and yellow fever; while for the last the immune serum has been employed with good results as a prophylactic measure. "In leptospiral infections treatment by serum is the best of all," whereas in syphilis the chief point aimed at and attainable is to increase the natural defences of the body by chemical means, though the author looks forward to the time when a prophylactic vaccination will be found against syphilis.

H. Harold Scott.

DE LAVERGNE (V.) & FLORENTIN (P.). **Fuso-spirochétose à localisation rectale.**—*C.R. Soc. Biol.* 1925. May 1. Vol. 92. No. 14. pp. 1097–1098. [3 refs.]

In a case of amoebic dysentery in Syria the authors observed that a small ulcer in the upper part of the rectum was covered by a membrane in which they were able to demonstrate spirochaetes and fusiform bacilli like those in Vincent's angina. It is suggested that this affords an explanation of the improvement of certain cases after the use of arsenicals.

E. H.

FRANCHINI (Giuseppe) & MAGGESI (Bruno). **Reperto di spirochete in un caso mortale di febbre biliosa emoglobinurica.** [The Finding of Spirochaetes in a Fatal Case of Blackwater Fever.]—*Policlinico.* Sez. Med. 1925. Feb. 1. Vol. 32. No. 2. pp. 96–104. With 2 text figs. [7 refs.]

The observations were made in a patient who died of blackwater fever in Italy after his return from Katanga, in Africa, where he had suffered from malaria and jaundice. Examination of the blood and organs did not reveal any malarial parasites, though pigment was present in the leucocytes. It is claimed, however, that by triple-centrifugation of the blood a few spirochaetes similar to those described by BLANCHARD and LEFROU (this *Bulletin*, Vol. 20, p. 138) were discovered. They were also said to be present in the spleen and in inoculated guineapigs. [The claim that malaria was excluded by the examinations made cannot, of course, be accepted, while the micro-photograph of the leptospira bears no resemblance to any organism, and is only of use in serving to illustrate what the authors are willing to accept as evidence of infection.]

E. H.

LEGER (Marcel). **Spirochètes sanguicoles, au Sénégal, de l'homme de la Musaraigne et de divers Muridés.**—*Revista Méd. de Angola.* (No. especial 1° Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 279–285. [10 refs.]

A useful summary of the records of relapsing fever in Senegal, together with a consideration of the spirochaetes found in Crocidura (shrew-mouse) and in various rodents. The author has found that *Sp. crocidurae* (see this *Bulletin*, Vol. 20, p. 139) occurs naturally in a fairly high percentage of animals, for out of 30 *Crocidura stampflii*, 6 were infected, 3 *Mus decumanus* out of 30, 4 *Mus coucha* out of 20, and 4 *Golunda campanae* out of 30; the spirochaete, in all, closely resembles that from cases of human relapsing fever in Senegal, and the suggestion is made that they may serve as a reservoir of the disease. The relapsing fever of Senegal seems to differ from both *Sp. recurrentis* and *Sp. duttoni*; and as *Ornithodorus moubata* does not occur there, it would be necessary to assume a new method of transmission if the above-mentioned animals act as a reservoir of the virus.

E. H.

DRAGTEN (Stuart). **Spirochaeten op de slijmvliezen van trachea en bronchiën, en de bronchitis spirochaetosa van Castellani.** [Spirochetes on the Mucosa of Trachea and Bronchi, and the Bronchitis Spirochetosa of Castellani.]—*Herinneringsbundel Inst. v. Trop. Geneesk. Leiden.* 1924. pp. 153–177.

The paper gives a summary of the literature of spirochaetal bronchitis, and the results of examination of normal animals and of 150 human cadavers. Spirochaetes in no way different from *S. bronchialis* (except that they remained alive 8-10 hours after the death of the host) were commonly met with. They were more numerous in cases where the bronchial or tracheal mucosa showed signs of inflammation, but never exceeded in number 4 spirochaetes per slide. It therefore seems reasonable to conclude that the finding of spirochaetes morphologically identical with *S. bronchialis* should justify the diagnosis "bronchitis spirochaetosa" only in those cases where the organisms are present in large numbers.

N. H. Swellengrebel.

DE MELLO (Froilano). **Première contribution à l'étude des spirochétidés d'Angola.**—*Revista Méd. de Angola.* (No. especial 1° Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 287–313. With 29 figs. [9 refs.]

The author elaborates a morphological method of identifying spirochaetes based on the length, obtained by the measurement of about 100 individuals, divided by the average number of turns in the spirals. In this way is obtained a so-called "index of morphological identification" which is claimed to be of great value in distinguishing different races. The author employs the biometrical method of showing the length and number of turns in the spirochaetes measured, and in this way the mean length, etc., is very easily obtained, as the results are plotted in the form of a curve. This method has the additional advantage of enabling one to identify two or more species that occur together, as, for example, in the case of the mouth spirochaetes (see this *Bulletin*, Vol. 20, p. 137, and Vol. 21, p. 736).

The method is then applied to the identification of spirochaetes occurring in the intestine of a termite in Angola. *Saprospira hominis* is next

described as it occurs fairly frequently in human faeces in Angola, and a chart is given illustrating its dimensions.

Sp. eurygyrata was found in the faeces of all except 5 per cent. of the natives, and curves are given illustrating the dimensions of the spirochaetes in three cases. Two of these had the typical dimensions of *S. eurygyrata*, but the third also contained giant forms, which are supposed to be of animal origin.

Spirochaetes of the *eurygyrata* type were found in the faeces of various mammals such as the horse, mule, rabbit, guineapig, cattle, goat, sheep, cat, dog and pig, and the measurements of large numbers of specimens show that this spirochaete possesses individual variations in each species.

E. H.

DE MELLO (Froilano), D'ALMEIDA (Carlos) & REBELLO (Frederico). **Deuxième contribution à l'étude des spirochétidés de la Province d'Angola.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a, 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 315–326. With 3 plates.

The first part is concerned with the identification of the spirochaetes in a case of Vincent's angina in a negro, employing the biometrical method previously described. The average length was found to be 10μ to 20μ with a suggestion of the existence of two types, one 8μ to 12μ in length, and the other 13μ to 19μ. The majority of the spirochaetes had 6 to 11 spirals.

The second part [by Rebello] comprises notes on the spirochaetes of relapsing fever in Angola, together with a description of giant forms found in a case of this fever. Whereas the usual dimensions of this spirochaete are 11μ to 21μ in length, with an index of 3 (see above), in one case the average length was 20μ to 40μ, with an index of 2·4.

The third part [by de Mello] consists of a study of the spirochaetes found in "fuso-spirillary ulcers." Sometimes only one type of spirochaetes is found in the ulcer, whilst in other cases two or more types may be distinguished and the results are given of the measurements of 100 individuals of each of the various types. The author is of the opinion that the small fine type of spirochaetes is identical with *Sp. vincenti*, but fuso-spirillary ulcers may be caused by several races or species of spirochaetes associated with fusiform bacilli.

E. H.

PHILIBERT (André). **Conception moderne des spirochétoses.**—*Médecine.* Paris. 1924. Dec. Vol. 6. No. 3. pp. 207–212.

The author's conclusions are summarized in the statement that "spirochaetes are essentially septicaemic organisms, affecting secondarily the liver, kidney, meninges and nervous system; contagious by direct contact, or by an intermediate host in the body of which the parasite undergoes a cyclical evolution. They do not confer immunity."

E. H.

i. ADAMS (D. K.), BLACKLOCK (J. W. S.) & M'CLUSKIE (J. A. W.). **Spirochaete-like Structures in the Cerebro-Spinal Fluid of Animals used for Experimental Purposes.**—*Jl. Path. & Bact.* 1925. Jan. Vol. 28. No. 1. pp. 115–116. With 1 plate. [3 refs.]

ii. ——, —— & ——. **Spirochaetes in the Ventricular Fluid of Monkeys inoculated from Cases of Disseminated Sclerosis.**—*Ibid.* pp. 117–118. With 1 plate. [6 refs.]

i. The first article contains the description and figures of spirillar structures found almost constantly in the cerebro-spinal fluid of monkeys,

rabbits, and guineapigs. Figures of *Spirochaeta cuniculi* are given for comparison. Although the authors consider that the pseudo-spirochaetes "must be recognised as a source of confusion with true spirochaetes," the figures of these structures show very little resemblance to these characteristically-shaped organisms.

ii. The second article contains the account of spirochaetes found in the ventricular fluid of two monkeys (*Macacus rhesus*) inoculated with material from cases of disseminated sclerosis.

E. H.

Jakimov [Yakimoff], (V. L.). **A Case of Febris Volhynica (quintana).**—*Rev. Microbiol. & Epidemiol.* Saratov. 1924. Vol. 3. No. 3. English summary p. 214. [In Russian pp. 117–124. [46 refs.].]

Description of a case in a young man from Kiew. There were five febrile attacks, and in the first febrile period spirochaetes differing from *recurrentis* were seen in the blood. They had "the appearance of short structures with irregular curves." The author is favourably inclined to the view that these organisms are the causative agents of Febris Volhynica. The name *Spirochaeta Hissi-Werneri* is proposed in honour of the original describers of the disease.

E. H.

i. Achitouv (M.). **Mensuration des courbures des spirochètes.**—*C. R. Soc. Biol.* 1924. Dec. 5. Vol. 91. No. 34. pp. 1192–1194. With 1 text fig.

ii. Delamare (G.) & Achitouv. **Détermination des indices de courbure de spirochètes schématiques.**—*Ibid.* 1925. Jan. 23. Vol. 92. No. 2. pp. 81–82. With 1 text fig.

iii. Delamare (G.) & Achitouv. **Indices de courbure de** *S. recurrentis* **(var.** *venezuelensis***) et** *S. ictero-hemorragiae.*—*Ibid.* Mar. 27. No. 11. pp. 863–865.

iv. Takeuchi (Nobuyuki). **The Comparative Pathological Studies on the Rocky Mountain Spotted Fever. 1. Morphological Researches on the Origin of the Disease.**—*Aichi Jl. Experim. Med.* 1924. Dec. 20. Vol. 1. No. 4. pp. 175–195. With 8 figs. on 2 plates. [37 refs.]

v. Abbatucci & Gravellat. **Le typhus exanthématique est-il une spirochétose ?**—*Presse Méd.* 1924. May 14. Vol. 32. No. 39. p. 425. With 1 chart.

vi. Schwarz (Y.). **Broncho-Pulmonary Spirochaetosis.**—*Lancet.* 1924. Dec. 27. pp. 1331–1334. With 3 text figs.

i. A mathematical formula for the measurement of the length of each curve of a spirochaete.

ii. The measurement of the index of curvature of two drawings of spirochaetes in Brumpt's "Précis de Parasitologie." See above.

iii. The measurement of the index of curvature [see above] of 100 spirals of Brumpt's drawings of *S. recurrentis* (var. *venezuelensis*) and an equal number of *S. ictero-haemorrhagiae*. The index of the former varied between 0·13 and 0·57, the average being 0·32; in the latter, the figures range from 0·43 to 1·18, with an average of 0·79.

iv. See this *Bulletin*, Vol. 21, pp. 664 and 927 (Hayashi & Takeuchi)

v. A comparison of the clinical features of spirochaetal infections and typhus fever leads the authors to suspect, as others have done, that the latter disease also may be a spirochaetosis.

vi. Observations on six cases of spirochaetal infection of the bronchia has led the author to speculate on their pathogenicity and origin and their relation to fusiform bacilli.

E. H.

Bezancon (Fernand) & Etchegoin (Eugenio). **Présence des spirochètes dans les crachats hémoptoïques.**—*C. R. Soc. Biol.* 1925. Jan. 23. Vol. 92. No. 2. pp. 55–56. [1 ref.]

Dimitracoff (C.). **Broncho-spirochétose de Castellani.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. Jan. 1. Year 40. 3rd Ser. Vol. 48. No. 39. pp. 1774–1776. [11 refs.]

Hudson (Bernard), Morland (A. J.) & Zimmerli (E.). **Broncho-Pulmonary Spirochaetosis.** [Correspondence.]—*Lancet.* 1925. Jan. 17. p. 156. With 2 text figs.

Kouwenaar (W.). **Spirochaetosis febrilis.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1925. Vol. 65. No. 2. pp. 219–237.

de Mello (Froilano). **Caractères du** *Spirochaeta bronchialis* **Cast.**—*Bull. Soc. Path. Exot.* 1924. Dec. 10. Vol. 17. No. 10. pp. 899–906.

Mironesco (Th.). **Spirochétose bronchiale et autres spirochétoses observées en Roumanie.**—*C. R. Soc. Biol.* 1925. May 1. Vol. 92. No. 14. pp. 1164–1166. [5 refs.]

RAT-BITE FEVER.

Lanford (J. A.) & Lawson (E. H.). **Etiology of Rat Bite Fever. Preliminary Report.**—*New Orleans Med. & Surg. Jl.* 1925. Mar. Vol. 77. No. 9. pp. 349–351. With 3 text figs. [9 refs.]

Description of a case of rat-bite fever occurring in New Orleans. By injecting white mice with material obtained from a swollen lymph node in the neighbourhood of the bite, 42 days after patient had been bitten by a rat, the typical *Spirochaeta morsus muris* [*Spirillum minus*] was recovered. In the discussion on the paper, it was stated that very frequently cases of this disease give a positive Wassermann reaction.

E. Hindle.

Monroe (P. W.) & Mooser (Herman). **A Case of Rat-Bite Fever.**—*Jl. Amer. Med. Assoc.* 1925. Mar. 21. Vol. 84. No. 12. p. 890. [2 refs.]

The report of an occurrence of this disease in Mexico City, in an English boy who had been bitten by a rat. Animals inoculated with the serum from the site of the wound became infected and showed the typical organisms [*Spirillum minus*] in the blood. The patient was cured by injections of neo-arsphenamin.

E. H.

Weiss. **Ueber die "Rattenbisskrankheit."** [Rat-Bite Fever.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. May 1. Vol. 29. No. 5. pp. 244–248.

A description of two cases of this disease observed in Europeans in Kenya Colony, and successfully treated by injections of salvarsan.

E. H.

Aoki (Kaoru), Sakai (Kikuwo) & Hayashi (Toshiteru). [**On Spirochetosis of the Mouse and Other Animals.**]—*Tokyo Ijishinshi* (*Tokyo Med. News.*). 1924. Oct. No. 2390. [Summarized in *Japan Med. World.* 1925. Feb. 15. Vol. 5. No. 2. pp. 40–41.]

The authors record the presence of a spirochaete [presumably *Spirillum minus*] in the blood of mice, rats, and other rodents.

E. H.

INFECTIOUS JAUNDICE.

KÖRNER. **Ueber eine Epidemie von Weilscher Krankheit.** [An Epidemic of Weil's Disease.]—*Deut. Med. Woch.* 1925. May 8. Vol. 51. No. 19. pp. 772–774. [16 refs.]

Description of an outbreak of infectious jaundice occurring in July and August, 1924, at a police school near Magdeburg, in the course of which about 76 patients showed one or other of the signs of the disease, but only 26 definite jaundice. Incidentally, the author mentions that many other cases were observed in the neighbouring districts, and also slaughter-house cattle showed signs of jaundice. Spirochaetes were not observed in these cattle, but the possibility that they served as agents for the dissemination of the disease is mentioned.

In the school epidemic, patients were treated by injections of immune serum from rabbits that had been infected with spirochaetal jaundice. A marked improvement was observed in most cases and the development of jaundice arrested.

After a lengthy account of the symptoms of some of the cases, the author discusses the mode of infection, and comes to the conclusion that the baths in a certain bathing establishment were responsible, for as soon as it was closed no further cases of the disease were observed.

[It should be noted that Leptospira were not observed in any of these cases, the diagnosis being based on clinical symptoms. In two cases the blood of convalescents was found to agglutinate *Spirochaeta ictero-haemorrhagiae* in cultures.]

E. Hindle.

LYON (D. M.). **Spirochaetal Jaundice. Report of a Small Epidemic. With Microscopical and Experimental Observations by** BUCHANAN (G.).—*Lancet.* 1925. Mar. 7. pp. 504–507.

The first part of this article gives details of seven cases of spirochaetal jaundice occurring in Edinburgh during the summer of 1924. They occurred in two families, and in the first one there is evidence suggesting that the source of infection was a small child from Kelantan (Malay Peninsula), who was afterwards found to be infected.

The clinical symptoms are described in detail. The most pronounced were gastro-intestinal disturbances, jaundice and haemorrhages; in addition, nausea, anorexia, sickness and vomiting were present in all. Three of the cases were given each two injections of 10 cc. of anti-spirochaetal serum prepared from a strain of spirochaetes isolated from rats caught in East Lothian. In all, the injection was followed by the temperature returning to the normal, but no other effect was noticed.

The second part of the paper [by G. Buchanan] deals with the microscopical and experimental observations. Spirochaetes were observed in the urine of all seven; in one case they were present up to the 66th day of the disease, an unusually long period, as they generally disappear before the 40th day. Blood was obtained from three cases, but both direct examination and animal inoculations were negative. Altogether, 44 animals were inoculated with the urine

of the patients, and although 7 animals showed the characteristic localized lung haemorrhages, only one showed typical spirochaetal jaundice, with spirochaetes present in the organs. In a final discussion, the author shows that infection by contact is strongly suggested and as the agency of spread points to the urine.

E. H.

GOUDSMIT (J.), HAMMER (E.) & WOLFF (J. W.). **Onderzoekingen bij een geval der ziekte van Weil.** [Studies on a Case of Weil's Disease.]—*Nederl. Tijdschr. v. Geneesk.* 1925. Jan. 31. Vol. 69. 1st Half. No. 5. pp. 430–442. With 1 plate & 1 fig. [9 refs.]

Clinical, pathological-anatomical and bacteriological examination of a case of Weil's disease of a man in Zaandam, ending fatally within a week (17-24 October, 1924). The clinical features led to the probable diagnosis of Weil's disease.

The anatomical finding did not reveal any marked alterations; the liver showed a highly developed uncomplicated degeneration, the kidneys an acute interstitial inflammation with numerous Leptospira, mainly localized in the interstitial tissues; no splenomegaly; orange-yellow tinge and numerous small haemorrhages on the skin. Scanty Leptospira were present in the muscles of the heart and the intercostal muscles; none in spleen, liver and lungs.

The blood-serum taken shortly before death did not agglutinate cultural Leptospira cultivated from Amsterdam rats and from a Berlin case of Weil's disease, whereas the serum from a patient of Weil's disease collected in Paris caused agglutination up to a dilution of 1 : 50. Repetition of the agglutination-test being made impossible by the death of the patient, two guineapigs were inoculated in the peritoneum with material from his liver (although no Leptospira were found there). These animals suffered from typical Weil's disease, so did the subinoculated ones, death occurring in 6–7 days after inoculation (except one which recovered and remained a carrier of Leptospira). Cultures likewise succeeded. The serological affinities of this human strain form the object of a study, the results of which will be published later.

The cause of the occurrence of this isolated case is not known. But on October 8th the patient fell into a backwater of the river Zaan in the neighbourhood of a number of cess-pits and of the public dust-heap, where rats are numerous (2 out of 7 were found infected with Leptospira).

N. H. Swellengrebel.

DE LAVERGNE (V.) & PERRIER (P.). **A propos d'un cas de spirochétose ictéro-hémorragique. Absence d'agglutinines spécifiques. Parallélisme entre l'évolution de l'azotémie et la marche de la température.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. Apr. 2. Year 41. 3rd Ser. Vol. 49. No. 12. pp. 513–516. [2 refs.]

Description of a case of infectious jaundice, apparently acquired as a result of bathing in the Marne. There is no question about the diagnosis either clinical or experimental, and yet the patient's blood, collected on the 15th and 35th days of the disease, and examined by Dr. PETTIT, contained no specific agglutinins.

The authors discuss the febrile symptoms of infectious jaundice and show that there is a correlation between the temperature and the amount of urea, or other waste nitrogenous matters, in the blood. When azotaemia appears, the temperature falls and remains low until the amount of urea in the blood returns to the normal, when it again rises. The disease thus shows two febrile attacks separated by a period of low temperature, during which there is an excess of urea in the blood. This elimination of nitrogen is supposed to act as a check on the temperature, and the authors suggest that without this there would be continuous fever in cases of infectious jaundice.

E. H.

TAPIE (Jean) & BOUNHOURE (L.). **Deux cas de spirochétose à forme méningée.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. Apr. 30. Year 41. 3rd Ser. Vol. 49. No. 14. pp. 604–609. [7 refs.]

The description of two cases of meningitis, in both of which spirochaetes ultimately appeared in the urine, and in one case slight jaundice developed. It is to be noted, however, that these spirochaetes were inoculated into guineapigs with negative results; and the serum diagnosis in the only patient examined was also negative. The authors consider that there may be a spirochaete, (allied to *S. icterohaemorrhagiae*) pathogenic for man and not for guineapigs.

[From the author's description of this spirochaete as "faiblement onduleux," there is considerable doubt about their identification, for such a term could hardly describe the appearance of the Leptospira of infectious jaundice.]

E. H.

VANNI (Vittorio). **Sulla diagnosi di spirochetosi ittero-emorragica.** [The Diagnosis of *Spirochaeta ictero-haemorrhagiae*.]—*Policlinico. Sez. Prat.* 1925. Jan. 19. Vol. 32. No. 3. pp. 81–82. [4 refs.]

The author finds that if Leptospira are inoculated intraperitoneally to guineapigs they can be detected in the blood 24 to 48 hours later. In doubtful cases of Weil's disease 5 cc. of the patient's urine should be inoculated intraperitoneally into guineapigs and the heart blood of the animal examined 48 hours later.

E. H.

KURODA (Tsu). [**Experimental Studies on the Therapy of Weil's Disease. I. Communication.**]—*Chiba Igakkwai Zasshi* (*Jl. of Chiba Med. Soc.*). 1924. Nov. Vol. 2. No. 6. [Summarized in *Japan Med. World.* 1925. Feb. 15. Vol. 5. No. 2. p. 44.]

As a result of a study of the action of immune serum on guineapigs infected with *Leptospira icterohaemorrhagiae*, the author finds that it is necessary to administer the serum before marked symptoms appear if a protective action is to be obtained.

E. H.

VANNI (Vittorio). **Le alterazioni epatiche nella spirochetosi ittero-emorragica.** [Hepatic Changes after Infection with *Spirochaeta ictero-haemorrhagiae*.]—*Riforma Med.* 1925. Mar. 16. Vol. 41. No. 11. pp. 244–245. With 2 text figs. [5 refs.]

From a study of the liver of two human cases of Weil's disease and about 100 guineapigs experimentally infected, the author finds that in the periphery of the lobules there occur small nodules composed mainly of lymphocytes. Numerous spirochaetes were present in these regions, but were absent elsewhere. The only other changes were those characteristic of acute inflammation, such as congestion and cloudy swelling. These nodules are considered to be peculiar to infectious jaundice, since they differ in their cellular constitution from other conditions in which focal necrosis of the liver occurs, such as syphilis, miliary tuberculosis, typhoid, etc. [see paper by CASTILLO, *ante*, p. 184].

E. H.

SHIGA (Akira). **Untersuchungen ueber die Beziehungen der Wasserspirochäte (*Spirochaeta pseudoicterogenes* Uhlenhuth u. Zuelzer) zu dem Erreger der Weilschen Krankheit (*Spirochaeta icterogenes* Uhlenhuth u. Fromme s. *Spirochaeta icterohaemorrhagiae* Inada u. Ido.).** [Researches on the Relationship between the Water Spirochaete (*S. pseudo-icterogenes*) and the Causative Organism of Weil's Disease (*S. icterogenes* or *S. ictero-haemorrhagiae*).]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1924. June 25. Vol. 40. No. 1/2. pp. 148–171. [34 refs.]

The paper describes certain differences between the spirochaete of Weil's disease and the morphologically identical forms found in water. It is noted that the water spirochaete is much more resistant to the action of metals than *S. icterogenes*, and the author reproduces a series of tables illustrating the respective resistances of the two varieties to copper, lead, iron, brass and mercury. In their reaction to trypoflavin, argoflavin, rivanol, optochin, chloramin, glawelin and vuzin, there was no marked difference between the two. When exposed to ultra-violet rays the water spirochaete was much more resistant, as tested by the subsequent growth of the organisms in diluted rabbit serum medium. *S. icterogenes* will only continue to grow in culture media containing 0·85 per cent. sodium chloride, whilst *S. pseudo-icterogenes* will grow in media containing 1·2 per cent. The gradual replacement of the serum in the diluted serum media stops the growth of both spirochaetes, but *S. pseudo-icterogenes* will continue to grow in milk diluted with water. By using diluted immune sera as culture media it was found that this prevented the growth of the homologous spirochaetes only. Similarly specific agglutination with immune sera was obtained.

E. H.

CARBO-NOBOA (J. M.). [**Primer Caso de Leptospirosis Icterohemorragica en el Ecuador.**]—*An. Soc. Méd.-Quir. del Guayas.* Guayaquil. 1924. Apr. Vol. 4. pp. 97–111. With 1 microphotograph. [Summarized in *Bull. Inst. Pasteur.* 1924. Nov. 30. Vol. 22. No. 22. p. 898.]

The first record of *Leptospira ictero-haemorrhagiae* occurring in Ecuador. The spirochaete was obtained by preserving the citrated blood of the

patient, mixed with Noguchi's medium, for a period of 12 days, and then inoculating into guineapigs, when the organism was found in sections of the kidney.

E. H.

i. Kohshina (Yoshimori). [**A Contribution to the Per Oral Infection of** *Spirochetosis Ictero-hemorrhagiae.*]—*Tokyo Igakkwai Zasshi (Jl. Tokyo Med. Soc.).* 1924. June. Vol. 38. No. 6. [Summarized in *Japan Med. World.* 1925. Jan. 15. • Vol. 5. No. 1. p. 17.]

ii. Kachi (Yoshiwo). [**Chemical Studies on the Blood of** *Spirochetosis Ictero-hemorrhagica.*]—*Ibid.* 1924. Aug. Vol. 38. No. 8. [Summarized in *Ibid.* p. 17.]

i. By feeding guineapigs with cultures of *Spirochaeta ictero-haemorrhagiae*, a certain proportion of them became infected, as many as 50 per cent. when the animals were fasting.

ii. A marked increase was observed in the nitrogen residue contents of the blood, during the course of infection with infective jaundice. The concentration was much higher than any observed in other diseases, with the exception of uraemia.

E. H.

Bonne (C.). **Comparaison du spirochète des rats d'Amsterdam avec une souche française de spirochétose ictéro-hémorragique.**—*Ann. Inst. Pasteur.* 1925. Jan. Vol. 39. No. 1. pp. 35–44.

A strain of Leptospira isolated from rats in Amsterdam has been subjected to various serological and other tests and has been found to be practically identical with the strain used in Pettit's laboratory for the diagnosis of Weil's disease.

E. H.

YELLOW FEVER.

CRAN (James). **The Results of the Noguchi Treatment of the Prophylactic Measures employed in the 1923* Yellow Fever Epidemic in Belize.** [British Honduras.]—*Jl. Trop. Med. & Hyg.* 1925. Jan. 15. Vol. 28. No. 2. pp. 26–29. Also in *Proc. Internat. Conference on Health Problems in Trop. America.* pp. 194–200. [United Fruit Company, Boston, Mass.]

An account of an outbreak of yellow fever occurring in Belize, in 1921, which is of interest because exact records were kept of the history of the epidemic. The outbreak occurred after the summer holidays in a large secondary college a mile from Belize, about half the pupils of which came from Salvador, Guatemala, Mexico and Honduras, and as yellow fever was known to have occurred in the first three countries within the past year, it is evident that an ambulatory case of the disease must have returned amongst the pupils.

A total of 17 cases occurred, and all received inoculations of Noguchi's serum; 4, who were already in their 4th to 6th day, died; of the remaining 13, all received the serum on the 1st or 2nd day of the disease, and only 1 died. Ten of the latter had previously been inoculated with Noguchi's vaccine, along with the other pupils, but developed the disease within 10 days of being vaccinated. The infection was stamped out by removing all the pupils to a locality where no stegomyia existed, and then destroying all mosquitoes in the buildings by intensive fumigation.

This outbreak later reached the town itself, and three persons became infected. Incidentally, two of these were whites, and the author remarks that it was a strange coincidence that they were the only whites who had not been vaccinated against the disease, whilst 100 or 200 who had been inoculated with Noguchi's vaccine, and were equally exposed, escaped infection.

A local fish, known as "*Billums*," is now being largely used for destroying mosquito larvae, as it lives well in tanks, and two are said to be able to keep an ordinary tank free from mosquitoes.

[The evidence in support of the author's view that "Noguchi's vaccine is of value," is very unconvincing, considering the results obtained with the pupils, but the administration of Noguchi's serum in the early stages of the disease seems to be attended with success.]

E. Hindle.

DE CAMPOS (Geminiano). **A febre amarella em Caruarú.**—*Brazil-Medico.* 1924. May 17. Year 38. Vol. 1. No. 20. pp. 281–282.

Caruarú, Pernambuco State, is known as the "Children's Cemetery," and the author states that between 80 and 90 per cent. of them are attacked by yellow fever in some form, severe or mild, and of these about 40 per cent. die. The remainder grow up immune, so that "it is no exaggeration to say that 85–90 per cent. of those who have been born and brought up in Caruarú are immune owing to their having suffered from an attack of the disease in infancy."

H. Harold Scott.

* An obvious misprint for 1921.

Rivas (Pedro F.). **La profilaxis de la fiebre amarilla en Yucatan.**—*Rev. Med. de Yucatan.* 1924. June & Sept. Vol. 13. Nos. 2 & 3. pp. 25–36; 55–65. [6 refs.]

There are three main endemic foci of yellow fever in the Peninsula of Yucatan, namely, Mérida, Campeche, and El Carmen. For prevention the chief points to be attended to are, firstly, antimosquito-measures to be applied with special energy in the endemic foci; and, secondly, the use of Noguchi's vaccine with cultures of *L. icteroides*. The use of the anti-serum is also of value.

H. Harold Scott.

Correira (Alberto Carlos Germano da Silva). **O problema da febre amarela em Angola e os seus climas maritimos.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 3. 3a. 4a. e 5a. Sessões.). 1923. Aug. No. 4. pp. 247–308. [12 refs.]

The history of yellow fever is first considered, dating back between 60 and 70 years; various towns are mentioned in detail, with certain meteorological conditions of each and tables giving the maximum, minimum and mean temperatures, the degrees of humidity, the atmospheric pressures and the prevailing winds for the past half century, correlating these as far as possible with the disease. The results hardly seem to jusitfy the enormous amount of work which the gathering together of these statistics must have entailed.

H. Harold Scott.

Gautier. **La fièvre jaune au Dahomey en avril et mai 1924.**—*Ann. de Méd. et de Pharm. Colon.* 1924. May-June-July-Aug. Vol. 22. No. 2. pp. 198–204.

A description of five cases of yellow fever at Bohicon and one at Guidah, all of which were fatal, and the prophylactic measures adopted to prevent the spread of the epidemic. It is noteworthy that the last case of yellow fever at Bohicon, previous to these, occurred in 1912.

E. H.

Perrín (Tomás G.). **La Leptospira de Noguchi.**—*Arch. Inst. Nac. Hig. Alfonso XIII.* 1923. Aug. Vol. 2. No. 2. pp. 1–17. With 12 figs on 6 plates.

A general account of our knowledge of *Leptospira icteroides*, including the author's own observations on the infection in the guineapig. The parasite has been found not only in the liver and kidney, but also in the dermis of the skin, the muscles (especially the cardiac), the supra-renal bodies, lungs, testes, walls of the blood-vessels, bladder, gall-bladder, lymphatic glands, cerebral hemispheres and cerebellum.

E. H.

Hoffmann (W. H.). **El liquido cefaloraquideo en la fiebre amarilla.** [The Cerebrospinal Fluid in Yellow Fever.]—*Sciencia Medica.* 1924. May 31. Vol. 2. No. 5. pp. 242–243.

Since *Spirochaeta pallida* and *Leptospira icterohaemorrhagiae* may invade the cerebrospinal fluid, so may the organism of yellow fever, especially as central lesions—congestion, haemorrhage, increase of

spinal fluid—have been recorded in this disease. The author, therefore, advocates a more detailed clinical and experimental study of this secretion in cases of yellow fever and suggests that such may elucidate some of the symptoms, such as the vomiting, the slow pulse, hiccough, coma and convulsions.

H. Harold Scott.

Dieterich (Frederick H.). **The Filterability of *Leptospira icteroides* in Culture.**—*Amer. Jl. Trop. Med.* 1924. Nov. Vol. 4. No. 6. pp. 553–555. [7 refs.]

The author succeeded in filtering cultures of *Leptospira icteroides* that had been grown for eight weeks on Noguchi's semi-solid medium, a Berkefeld filter V being employed. Examination of the filtrate immediately after filtration showed no Leptospira, but many refractive granules, and inoculation into two guineapigs produced typical symptoms of yellow fever in each case. Cultures of the filtrate were made, but there was no visible evidence of growth, though on dark field examination three Leptospira were found in 12 preparations, and numerous refractive granules; the virulence of the cultures was proved by inoculation experiments.

These experiments furnish confirmatory evidence of the filterability of this organism, but whether in its spiral form or in a granular phase is not yet determined.

E. H.

i. Hoffmann (W. H.). **Die pathologische Anatomie des Gelbfiebers.**—*Klin. Woch.* 1925. Apr. 2. Vol. 4. No. 14. pp. 632–638. With 2 text figs., and *Siglo Méd.* 1925. Apr. 11 & 18. Vol. 75. Nos. 3722 and 3723. pp. 361–364; 397–400. With 2 text figs.

ii. Agramonte (Aristides). **Some Observations upon Yellow Fever Prophylaxis.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 201–208. [United Fruit Company, Boston, Mass.]

i. The subject matter of this paper has already been dealt with (this *Bulletin*, Vol. 22, p. 189).

ii. See this *Bulletin*, Vol. 22, p. 191.

E. H.

Muller (Henry R.). **Histopathology and Hematology of Experimental Yellow Fever.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 180–193. [4 refs.] [United Fruit Company, Boston, Mass.]

Noguchi (Hideyo), Muller (Henry R.), Torres (Octavio), Silva (Flaviano), Martins (Horacio), Santos (Alvaro Ribeirodos), Vianna (Godofredo) & Biáo (Mario). **Experimental Studies of Yellow Fever in Northern Brazil.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 169–179. [Numerous refs.] [United Fruit Company, Boston, Mass.]

AMOEBIASIS AND DYSENTERY.

Amoebiasis.

(i) Drbohlav (Jaroslav). **Demonstration of a Method of Cultivating *Entamoeba histolytica*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* (Proceedings of Laboratory Meeting, 20 Nov. 1924). 1924. Nov. & Dec. Vol. 18. Nos. 5 & 6. pp. 238–240. [Issued Feb. 1925.]

(ii) Drbohlav (Jaroslav). **Présentation d'amibes dysentériques en cultures.**—*Bull. Soc. Path. Exot.* 1925. (Séance du 11 fév.) Vol. 18. No. 2. pp. 121–122. [Issued March 1925.]

(iii) Boeck (William C.) & Drbohlav (Jaroslav). **The Cultivation of *Endamoeba histolytica*.**—*Proc. Nat. Acad. Sci.* (Washington). 1925. May 15. Vol. 11. No. 5. pp. 235–238. [3 refs.]

(iv) Boeck (William C.) & Drbohlav (Jaroslav). **The Cultivation of *Endamoeba histolytica*.**—*Amer. Jl. Hyg.* 1925. July. Vol. 5. No. 4. pp. 371–407. With 4 plates. [11 refs.]

At the 20th annual meeting of the American Society of Tropical Medicine, held at Chicago last summer, an important communication was made by Dr. W. C. Boeck and Dr. J. J. Drbohlav. Their paper—read by the former on June 10th, 1924—was entitled "The cultivation of a pathogenic amoeba (*Entamoeba histolytica*) from a case of relapsed amoebic dysentery"; but apart from brief mention in the published minutes of the meeting (*Amer. Journ. Trop. Med.* (1924), IV, 440), it did not appear in print. Later in the year the authors were able to extend their original observations, and a complete but belated account of their joint researches has just appeared for the first time (iv, above). Meantime, however, Dr. Drbohlav had returned to Europe, and demonstrated their methods and results at a meeting of the Royal Society of Tropical Medicine and Hygiene in London (November, 1924), and afterwards at a session of the Société de Pathologie Exotique in Paris (February, 1925). Brief accounts of both these demonstrations were subsequently published (i and ii, above); but although they are virtually "preliminary communications," they contain certain new observations not included in the original work. A preliminary account of this—the original joint observations made in America—was read at the Boston meeting of the National Academy of Sciences (U.S.A.) in November, 1924, but not published until May this year (iii). [By error it is stated in this paper (iii, p. 238) that the original cultures were kept in 1925—not 1924, which is the correct date.]

It seems advisable to record these particulars here, since the dates of reading and of ultimate publication of the several papers—taken in conjunction with their contents—may easily mislead present readers and future bibliographers unacquainted with the circumstances. Publication of the full memoir by both authors (iv) was unfortunately retarded, and as a consequence this work now makes its appearance long after its contents have become widely known. Indeed, it is common knowledge that the original results—first made public, though not printed, over a year ago—have meanwhile been confirmed and amplified by many other workers in England, France, and America. For the benefit of interested workers who have not ready access to current periodicals, it may be added that no paper on this subject has been published in the *Amer. Journ. Trop. Med.*—as advertised in the programme of the Chicago meeting: that the paper stated (in ii) to be about to appear in the *Journ. Exp. Med.* is really No. iv (above) and has not been published in that journal: and that a further paper promised (in ii) for the March number of the *Ann. de Parasitol.* this year was not so issued.

As will be seen in the publications cited, Boeck and Drbohlav obtained their original cultures of *E. histolytica* accidentally, using a medium devised by the former for the cultivation of intestinal flagellates. Afterwards various modifications of this medium—and also others—were tried. The procedure finally adopted and recommended is of the simplest, and consists essentially in the employment of a medium which is half liquid and half solid. The solid is distributed in test-tubes in the form or ordinary bacteriological slants, and the liquid is then added so as to cover the solid. The latter may consist of coagulated whole egg (4 eggs thoroughly emulsified in 50 cc. of Locke's solution—distributed, sloped, and set by heat in the usual way), or of Dorset's egg-medium, or of ordinary bacteriological blood-agar. The liquid constituent may be composed of inactivated serum (human or horse) diluted with Locke's solution (1 : 8), or egg-albumin diluted with Locke's or Ringer's solution (1 per cent. crystallized egg-albumin, or the white of one egg to the litre). The solid, after tubing, is sterilized in the autoclave, and the liquid—added afterwards—by filtration through a Berkefeld candle. The initial reaction of such media was found to vary from pH=7·2 to 7·8 ; and as this is the optimum for the growth of the amoebae, it is unnecessary to adjust it.

Material containing active forms of *E. histolytica* (from stools, etc.) is inoculated into the sterile tubes of medium—previously warmed to 37°C.—with a capillary pipette. It should be delivered into the bottom of the liquid, where the greatest growth of amoebae occurs at the interface between the solid and liquid. The cultures are then incubated aerobically at 37°C.

In such cultures the maximum growth of amoebae is usually seen on the second day of incubation. (A small drop of the sediment or surface growth at the bottom of the tube is removed with a sterile pipette and examined under the microscope.) Thereafter they diminish in number, and usually die out on the fifth or sixth day. In order to preserve the strain it is therefore necessary to inoculate subcultures (made in the same way as the initial culture) every second, third, or fourth day. In preparing and handling the cultures, the usual bacteriological precautions must be observed in order to prevent contamination.

Cultures of *E. histolytica* made in this manner are never pure, but contain a variety of bacteria and other organisms introduced with the initial inoculum. (Attempts to obtain pure cultures failed.) The medium was found suitable for cultivating not only *E. histolytica* but also *E. gingivalis* (ii) and several intestinal flagellates (*Trichomonas* and *Chilomastix* of man and the fowl, etc.). It is also very favourable for the growth of *Blastocystis*, which may overgrow the protozoa and hamper or prevent their cultivation. *Entamoeba coli* and *Endolimax nana* lived for three days in initial cultures, but the authors were unable to obtain subcultures of these species (iv).

It is a remarkable fact that *E. histolytica*, when cultivated by the methods described, feeds not upon living tissues or their products—as it invariably does in the lesions in man or the cat—but upon bacteria. In such cultures it adopts the food-habits characteristic of *E. coli*, and is thus able to live and multiply in a medium which at first sight would appear totally unsuitable for its maintenance. When red blood-corpuscles are introduced into the medium, however, the amoebae readily ingest them. The bearing of these observations—which are easily verifiable and undoubtedly correct—on the normal life and

development of *E. histolytica* is not yet clear, and can only be shown by further observations and experiments.

Using the methods indicated, the authors were able to isolate and cultivate two strains of *E. histolytica* from the stools of two different patients, whose clinical histories are briefly recorded (in iv). The first ("K" strain) was kept going through 152 subcultures from February 18 till October 25 (1924); the second ("E") through 47 subcultures from July 2 till October 1 (1924). Both strains were in the end lost accidentally. (Other similar strains were successfully isolated and maintained by Drbohlav in London (see i) and in Paris (see ii) subsequently.) The amoebae remained throughout morphologically identical with those in the patients' stools, and convincing evidence is presented (in iv) that the organisms so cultivated were really *E. histolytica*. The infections of both the original patients ("K" and "E") were apparently eradicated by treatment with emetine: the amoebae in their stools were morphologically typical of this species and characteristically pathogenic for kittens when inoculated intrarectally—producing typical amoebic dysentery: and the cultures when similarly inoculated produced the same results. One kitten (No. 102) inoculated with the faeces of patient "K" developed a typical amoebic abscess of the liver: another (No. 120), inoculated with cultures of the "K" strain after about 5 months of cultivation, also got a liver-abscess. The infections produced by inoculating cultures into kittens were readily transmitted to other kittens in the usual way, and from kittens so infected the amoebae were repeatedly recovered in culture. In short, the evidence advanced to show that the authors have succeeded in cultivating *E. histolytica* is adequate and conclusive.

It was found that *E. histolytica*, when cultivated in the way described, did not lose its infectivity or pathogenicity for kittens. "The virulence of the amoebae was not influenced by prolonged cultivation." (The last wholly satisfactory experiment performed in this connexion is that on kitten No. 120, which was infected with "K" cultures—generation not recorded—about 5 months after the strain was isolated.) The amoebae multiplied in the cultures by binary fission in the usual way, but they did not encyst. Encystation was observed in only a single culture of the "E" strain—20 days after isolation (generation not stated)—and only 6 cysts were found. Neither the addition of skatol to the cultures, nor placing them in the ice-box, caused the amoebae to encyst—as related by Cutler [see this *Bulletin*, Vol. 14, p. 95]: nor did the authors succeed in cultivating *E. histolytica* by his methods. [This *Bulletin*, Vol. 12, p. 292.] They say, however, that their experiments "confirm" his work "with respect to the cultivability of *E. histolytica*"—a statement which appears equally applicable to the work of everybody else who has previously claimed to have cultivated this organism. Curiously enough, the authors make no reference to the antecedent observations of Barret and Smith, who undoubtedly succeeded in cultivating another intestinal *Entamoeba*—*E. barreti*, from a turtle. [See *Amer. Journ. Hyg.* (1924), iv. 155: also Taliaferro and Holmes, *ibid.* p. 160.]

There can be no doubt that these papers—the outcome of a felicitous collaboration between an American and a Czech, in the Medical School of Harvard—constitute a notable advance in the study of intestinal amoebae. Previous workers may possibly have succeeded in cultivating *E. histolytica*; but the discovery of the simple and certain methods here described has, for the first time, opened up many possible lines of

research which appeared hitherto unattemptable. The methods described are not perfect, and much still remains to be done for their improvement; but it is beyond dispute that the work of Boeck and Drbohlav has already attained a stage from which immediate further advancement of our knowledge of the intestinal amoebae is assured.

Clifford Dobell.

CLARK (Herbert C.). **The Distribution and Complications of Amoebic Lesions found in 186 Postmortem Examinations.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 365–379. With 2 figs. [3 refs.] [United Fruit Company, Boston, Mass.], and *Amer. Jl. Trop. Med.* 1925. Mar. Vol. 5. No. 2. pp. 157–171. With 2 text figs. [3 refs.]

The period of time covered by these records is from 1905 to 1923 inclusive. The incidence of amoebic abscess of the liver, amoebic appendicitis, rupture of abscesses and intestinal ulcers, peritonitis, etc., warrant attention. The proportion of races in the autopsies is as follows: West Indian negroes, 133; Latin-Americans, 31; foreign whites, 22. There were 172 males and 14 females. Most cases occurred in the 3rd, 4th and 5th decades.

Causes of death.

Amoebic ulcerative colitis	64
Amoebic dysentery with liver abscess	80
Amoebic abscess of liver with insignificant intestinal lesions	15
Other causes	27

Intestinal Distribution of Lesions.

Entire colon involved	55
Entire colon and ileo-caecal valve	3
Entire colon and appendix	48
Entire colon, appendix and ileo-caecal valve	7
Caecum and ascending colon	24
Caecum, ascending colon and appendix	9
Caecum, rectum and sigmoid	8
Caecum, rectum, sigmoid and appendix	6
No primary lesion in intestine or appendix	7
Scar or almost healed lesions in colon	3
Appendix, caecum, splenic flexure and rectum ...	2
Rectum	2
Rectum and sigmoid	2
Appendix, caecum, both flexures and rectum ...	1
Rectum, sigmoid and splenic flexure	1
Appendix, caecum and splenic flexure...	1
Caecum, ascending and transverse colons	1
Appendix, caecum, ascending and transverse colons...	1
Rectum, sigmoid and descending colon	1
Appendix, caecum, ascending and transverse colons and hepatic flexure	1
Rectum, sigmoid, descending and transverse colons, both flexures	1

The incidence in the caecum, ascending colon, rectum, sigmoid flexure and appendix is to be noted. The ulcers were scattered throughout the colon in 60·7 per cent., in certain regions in 33·8 per

cent., and there were 10 cases (5·3 per cent.) in which no ulcers or only scars were found. The dependent portions represent the regions where the greatest stasis exists in the colon, affording a favourite resting place for the development of the entamoeba.

Complications associated with the intestinal ulcers.

Perforations of ulcers in the colon, site not stated ...	4
,, ,, ,, caecum, site not stated...	3
,, ,, ,, appendix...	3
,, ,, ,, rectum and sigmoid ...	3
,, ,, ,, sigmoid and appendix ...	1
,, ,, ,, splenic flexure	1
,, ,, ,, sigmoid	1
,, ,, ,, caecum and rectum ...	1
,, ,, ,, sigmoid and splenic flexure with appendix abscess	1
Appendix abscess	1
Peri-rectal abscesses	2
Faecal fistula	1
Amoebic fistula-in-ano	1

Thus, in 10·7 per cent. of cases, single or multiple perforation of amoebic intestinal ulcers had occurred and local peritonitis or general peritonitis resulted. During the 12 years the author examined six appendices in which extensive amoebic lesions were found.

In the series there were 95 cases (51 per cent.) which showed some involvement of the liver. Solitary abscesses had developed in 40 cases (42 per cent.) and multiple abscesses in 55 (58 per cent.). Amoebic ulceration of the colon, localized or general, was associated in 85 cases ; 3 revealed scars in the colon, and 7 no past history of amoebiasis.

Position incidence of liver abscesses.

Location.	*Number of Cases.*	*Percentage of Cases.*
Right lobe	53 ...	55·7
Right and left lobes ...	16 ...	16·8
All lobes	15 ...	15·7
Left lobe	8 ...	8·4
Location not stated... ...	2 ...	2·1
Right and Quadrate lobes ...	1 ...	1·05

Complications of Amoebic Liver Abscesses.

Nature of Complication.	*Number of Times.*
Rupture of abscess into the peritoneal cavity ...	9
Rupture of abscess into the lesser sac	5
Abscess perforating right dome of diaphragm ...	8
Right sub-diaphragmatic abscess	3
Abscess perforating diaphragm and body wall ...	1
Perforating wall of stomach	1
Rupture of a surgically-drained abscess into the vena cava	1
Rupture of old operation scar for a former drainage of liver abscess	1
Abscess pressure causing obstruction of duodenum and stomach	1
Abscess pressure causing obliteration of gall-bladder	1
Peritonitis, from escaped liver-abscess contents ...	17

Many so-called large single abscesses are not a solitary lesion, since a zone occurs round the large lesion composed of very small abscesses; when scattered throughout all parts of the liver, the abscesses vary from the size of a pea to that of a tennis ball. Sometimes an amoebic lesion of the liver will consist of a large, dark, haemorrhagic area of necrotic tissue. The average size of a large solitary abscess, of a kind which would cause clinical symptoms and attract attention, is about that of an orange and the liver weight will be about 2,600 grammes.

Five cases were seen in which healing of small abscesses, subsequent to the drainage of a large one, were seen. There was evidence of encapsulation.

Other forms of Secondary Amoebiasis encountered.

Peritonitis secondary to unruptured ulcers	19
Amoebic abscess of lung	6
Amoebic abscess of brain	4
Caecostomy wounds showing amoebic invasion ...	3
Amoebic thrombosis of vena cava and left renal vein	1
Amoebic thrombosis of portal radicle	1

There was one abscess of the lung without any perforation of the diaphragm. In all but one the brain abscesses were associated with a similar condition of the liver which had been drained by the surgeon. Caecostomy wounds through which irrigation treatments are given may become the seat of secondary amoebic invasion; a large zone round the opening becomes swollen, oedematous, and later suppurates; the entamoebae are abundant in the subcutaneous tissues.

In reviewing the records a very sudden decline in the number of cases of amoebiasis has been noted since the year 1914. During the years 1920-1923 only 3 came to autopsy out of 800 autopsies performed. Prior to the installation of new water systems there were 4,000 autopsies, which yielded 170 cases of amoebiasis (4·25 per cent.); after this there were only 2,800 autopsies, which yielded 16 cases, or 0·57 per cent.

P. H. Manson-Bahr.

Runyan (R. W.) & Herrick (A. B.). **Surgical Complications and Treatment of Intestinal Amoebiasis.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 336–345. [1 ref.] [United Fruit Company, Boston, Mass.] and *Amer. Jl. Trop. Med.* 1925. Mar. Vol. 5. No. 2. pp. 137–147. [1 ref.]

The complications requiring surgical intervention during the course of amoebic dysentery either arise from the direct action of the parasites or are of purely mechanical origin. A number of latent cases present distinct localizing symptoms in the region of the appendix. Symptoms vary from mere discomfort to typical appendicular colic. The clinical symptoms of alternating attacks of diarrhoea and constipation with a tentative diagnosis of appendicitis are quite characteristic. Before this symptom-complex was understood, many appendices were surgically removed, but since then the tendency has been to be ultra-conservative. Reinfection of the bowel from the appendix is possible. All cases of apparently definite chronic appendicitis with latent intestinal amoebiasis are advised to have appendectomy, to be followed in ten days time by the routine medical treatment. After a gridiron operation the patients are allowed to get out of bed as soon as they desire, and are usually up in a chair by 4th or 5th day. Stitches

are removed from the 7th to the 10th, after which treatment of their infection is begun. No patient has so far developed hepatitis or liver abscess.

Four cases of massive type of ulceration of the caecum have been encountered. A condition simulating a tumour is produced, and is caused by the enormous thickening of the bowel wall, which may affect not only the caecum, but the terminal ileum. The first case was thought to be a tumour of the kidney, the second carcinoma of the caecum, but the last two cases were correctly diagnosed by finding the amoebae in the faeces, previous to operation. In every instance it was found necessary to excise the caecum and to perform end-to-end anastomosis. Three out of the four patients recovered. The operation is necessarily a serious one, but it does not seem possible to evade it. The involvement of the *small* intestine is probably due to an extension of the process from the caecum, due to the almost complete obstruction and consequent damming up of the intestinal contents. Intestinal haemorrhage is another uncommon condition. Cases of very severe colitis, passing 20-30 bloody stools daily, with emaciation and dehydration are treated by continual irrigation of the large bowel following appendicostomy, or, more frequently, caecostomy.

Regarding liver abscess the authors do not consider the aspiration method offers any improvement over simple incision and drainage. During the last six years the authors have operated upon only 21 abscesses, of which one has died. Two cases of amoebic abscesses of the brain have been seen. Amoebae will occasionally destroy large sections of the abdominal or thoracic wall. Two such cases have followed caecostomy and one a trans-thoracic opening of an hepatic abscess ; these were, however, previous to the introduction of emetine.

P. H. M-B.

Kofoid (Charles A.), Boyers (Luther M.) & Swezy (Oliver). **Systemic Infections by** *Endamoeba dysenteriae.—Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 381–399. [35 refs.] [United Fruit Company, Boston, Mass.]

" *Endamoeba dysenteriae* " tends to spread in the margins of ulcers of the colon into the capillaries and smaller veins and thence may make its way into the liver, or through the heart to the lung and systemic circulation. Liver, lung and brain abscesses should thus be interpreted as examples of haematogenous invasions by way of the blood-stream. Infection of the bone marrow will result by this route. Whether or not the infection of the lymphatic glands occurs by the lymph stream or arterial system is unknown. Pathological conditions of the iris and retina and of the thyroid may be due to this organism, while the occurrence of amoebae in the testes, semen, spleen and skin ulcers afford evidence of its generalized distribution. The importance of continued clinical study in correlation with examination of tissues at autopsy and at surgical operations in cases of amoebiasis is most evident.

This paper gives details of the occurrence of " *Endamoeba dysenteriae* " in bone marrow, in the glands of Hodgkin's disease, and in the skin, all of which has been already reviewed in the *Bulletin* (see this *Bulletin*, Vol. 19, pp. 684 and 685, and Vol. 20, pp. 713 and 1002).

P. H. M-B.

VALLARINO (J. J.). **Preliminary Report on the Value of the Roentgen Ray in estimating the Extent of Amebic Infection of the Large Intestine.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 357–364. With 6 figs. [United Fruit Company, Boston, Mass.] and *Amer. Jl. Trop. Med.* 1925. Mar. Vol. 5. No. 2. pp. 149–156. With 6 text figs.

Routine X-ray barium meal examinations have been made in all cases of intestinal amoebiasis. The findings have been very suggestive. Firstly, defects were seen in all cases of amoebic infection due to *E. histolytica* with definite symptoms, whether mild or severe. Secondly, the X-ray findings correspond very well with the clinical phenomena in that the filling defects correspond with the points of tenderness in the abdomen, and thus determine the extent of the intestinal lesions and give clinicians data which could not otherwise be obtained. In the majority of the cases the bowel loses its normal contour and a mottled area is found instead. The lesions are usually situated in the caecum and ascending colon as far as the hepatic flexure; next in frequency in the sigmoid; much less often in the transverse and descending colon. Better information is obtained by giving the opaque substance by the mouth than by administration of barium enemata; the reason being that by the time it reaches the large bowel the barium has adapted itself to its surroundings and has followed the channel which offers least resistance. When given by enema the bowel is overfilled and becomes abnormally distended, so that the ulcers and pockets have not sufficient time to fill properly. The clinical symptoms do not always conform to the X-ray findings, for sometimes a more extensive ulceration is found than the clinical symptoms would suggest possible.

P. H. M-B.

GARIN (Ch.) & LÉPINE (Pierre R.). **The Acclimatization and the Frequency of Amebiasis in the Lyon Region in France. Two New Arsenical Compounds against Amebiasis: Stovarsol and Acetylarsan.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 309–316. [United Fruit Company, Boston, Mass.]

As far back as 1905 DOPTER had shown that amoebic infection was prevalent in certain parts of France. During the world war facilities for its introduction by the colonial troops were considerably increased, particularly in Lyons, where the disease is now by no means rare. It is certain that proper restrictions against possible carriers of amoebae at the frontiers and ports of entry will greatly diminish and possibly suppress amoebiasis in France. The results of enquiry into 208 cases of amoebiasis are given: 191 occurred in males; 16 in females; one was seen in a child. Forty (35 male and 5 female) were of exotic origin; of these 21 had come more or less into direct contact with colonial troops during the war; in 12 the origin was undetermined. Infection of women by their husbands was recorded in 10 per cent. of cases. Interhuman infection thus produced 72·5 per cent. of the cases.

Most of the patients had chronic diarrhoea and recurrent colitis with dysenteric periods. In long standing cases the authors think that injury to the adrenal glands and to the solar plexus results; in

44 instances there was evidence, in the low blood pressure, emaciation, pallor and pigmented patches, that these organs were affected.

Amoebiasis associated with Lamblia or Trichomonas is specially resistant to emetine; Stovarsol and acetylarsan appear to be effective against Lamblia. Stovarsol is given in pill form, 25 cgm., and may be dissolved in water; it may be associated with emetine, when the whole treatment should last four weeks. When it is used alone 75 cgm. is given daily for a week, intermitted for a week, and then resumed. The after treatment consists of stovarsol every other day for 1 to 2 months. The amoebae disappear in 4 days, the cysts in 8. Acetylarsan has been employed by Garin without the use of emetine in cases of hepatitis, the dose recommended being 75 cgm. once a week for four weeks. Acetylarsan may be combined with emetine. Lamblia and Trichomonas appear to be susceptible to the drug.

P. H. M-B.

ROGERS (Leonard). **The Prevention and Treatment of Amoebic Hepatitis and Liver-Abscess.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 346–355. [United Fruit Company, Boston, Mass.]

Records improvements in the diagnosis and treatment of amoebic hepatitis and liver abscess which have resulted from the author's researches and the introduction of emetine therapy. The statistics given and the authorities quoted have been reviewed in previous numbers of this *Bulletin.*

P. H. M-B.

IZAR (Guido). **Amebiasi polmonare.**—*Riforma Med.* 1925. Apr. 20. Vol. 41. No. 16. pp. 361–365.

This is an interesting account of infection of the lung with *E. histolytica.* Distinction is drawn between pulmonary amoebiasis secondary to or concomitant with hepatic or intestinal infection, and that arising primarily and exclusively in the lung. From a diagnostic and therapeutic point of view differences are stated to exist according to whether the lung focus is closed, *i.e.*, in the tissue itself, or open, *i.e.*, communicating with the outer air. If the sputum is mucopurulent and blood-stained, but not fetid, the condition is mainly, if not entirely, protozoal; when it becomes purulent and loses the reddish tinge, bacteria will be found to increase and amoebae relatively diminish; when, finally, it becomes fetid, liquid, more copious and greenish, bacteria predominate and amoebae may no longer be found. The author discusses the mode of infection of the lung and favours the haematogenous route rather than the lymphatic, or that by continuity from the liver through the diaphragm and pleura. He next describes the pathological anatomy and clinical course, and sums up the main results by postulating three forms: (1) The closed form of pulmonary amoebiasis in which the amoeba is alone the cause, with resultant infiltration and necrosis of the lung parenchyma. This yields to emetine with or without arsenic; (2) The open pulmonary abscess due to the amoebae and pyogenic organisms; this requires serum or vaccine therapy, or medical treatment, in addition to emetine, and may need surgical interference; (3) The open form with ulcero-phlegmonous

complications in which pyogenic organisms only can be found, the amoebae having disappeared. In this vaccines and serum therapy may be employed, but operative measures are practically a necessity.

H. Harold Scott.

Yaloussis (Evan). **Sur quelques cas de "Bronchoamibiase de Petzetakis."**—*Rev. Méd. et Hyg. Trop.* 1925. May-June. Vol. 17. No. 3. pp. 131–135. [11 refs.]

Three cases of bronchoamoebiasis have recently been studied from a radiographic point of view. Two of them had already been diagnosed and treated as pulmonary tuberculosis. The chief distinguishing points in the radiograph would appear to be a density at the hilum and the appearance of bronchoectatic cavities in the lobules. These three cases were primarily diagnosed by the discovery of amoebae in the sputum, and by their remarkable response to emetine therapy.

P. H. M-B.

Caussade (G.) & Tardieu (André). **Abcès amibien gangreneux du poumon droit indépendant d'un abcès amibien latent du foie chez un ancien colonial.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. Mar. 12. Year 41. 3rd Ser. Vol. 49. No. 9. pp. 363–370. [15 refs.]

The paper concerns a case of solitary amoebic abscess of the lower lobe of the right lung which had taken apparently seven, or it may be ten, years to develop and at last made itself evident by symptoms of pulmonary gangrene. It was quite independent of a similar abscess in the liver, which had given rise to no distinctive symptoms during life. After death, histological examination revealed a few amoebae in portions of the tissue which had escaped the gangrenous process. Other points of importance were the presence of numerous spirochetes and fusiform bacilli in the abscess cavity, and the development of a simple pneumothorax in the vicinity of the gangrenous focus.

The patient was a veteran colonial soldier who had served in Tonkin and had numerous attacks of amoebic dysentery. For 18 years he had suffered from periodic recurrence of fever with expectorations which were not foetid in character. Symptoms of gangrene of the lung developed suddenly in June, 1920. At autopsy, a well-defined hepatic abscess the size of an orange was found in the liver. At the base of the right lung a spherical abscess occupied the whole of the lower lobe; buried deep in the parenchyma it contained foetid green-coloured exudate. No communication through the diaphragm could be verified. The sequence of events appears to have been: amoebic dysentery, hepatic abscess, secondary pulmonary abscess, pulmonary gangrene, and pneumothorax.

P. H. M-B.

Tanganyika Territory. Annual Medical Report for the Year ending December 31st, 1923. pp. 182–183.—**Liver Abscess in a Native of Uganda: Operation, Recovery,** by C. F. Shelton.

A clinical record of a case of liver abscess in a Uganda native. Two full courses of emetine injections were given and were followed by a striking improvement in the condition of the patient. Eventually, however, open operation with the insertion of a drainage-tube had to be resorted to, and, subsequently, freer exit for the pus by means of Manson's trocar; some 75 oz. of pus were evacuated altogether. The abscess had caused

very considerable enlargement of the liver both upward and downward, with displacement of the heart outside the nipple line. The author is at a loss to explain the apparent efficacy of the third course of emetine subsequent to the second operation, for the first two courses of 10 gr. each had signally failed to prevent the reaccumulation of pus. 30 grains of emetine were administered altogether without the supervention of any recognizable toxic symptoms.

P. H. M-B.

D'Amato (H. J.) & González (J. Ortuño). **Una forma poco común de absceso hepático amebiano.**—*Semana Méd.* 1925. Jan. 15. Year 32. No. 3. (1618). pp. 117–122. [18 refs.]

The authors describe most minutely a case of abscess of the liver. There was pain, and all the usual physical signs, but no rise of temperature, and no polynucleosis but rapidly progressing anaemia. Operation was undertaken, and a large amount of chocolate-coloured pus removed. The absence of fever is accounted for by the fact that the abscess was of old standing and absorption of toxins slight or wanting, and later, when there was rapid extension of the abscess, the temperature remained normal "because there was no fresh infection." The absence of increase of polymorphonuclears is ascribed to the abscess being due to amoebic infection without accompanying bacillary action. The anaemia does not seem to be adequately explained in the absence of toxic absorption. The Wassermann reaction was negative, "a fact of no importance as the signs of hereditary syphilis were present." The authors sum up by saying that in a subject of hereditary syphilis an amoebic abscess of the liver may become acute, with the production of intense anaemia, but without rise of temperature or increase of the polymorphonuclears.

H. Harold Scott.

McGlannan (Alexius). **Amebic Abscess of the Liver. Report of a Case complicated by Subphrenic Abscess.**—*Jl. Amer. Med. Assoc.* 1925. June 27. Vol. 84. No. 26. pp. 1976–1978. [9 refs.]

The important features in this case were: The occurrence of an amoebic liver abscess in a French sailor who had apparently not been in the tropics, and the difficulty experienced in finding amoebae in the aspirated pus. The organisms did not become apparent until the wall of the abscess was scraped on the 24th day after the operation, and after frequent irrigation with quinine solution.

After the injection of emetine into the abscess cavity and the general injection of the same drug, great improvement in the clinical condition of the patient was noted. Radiography distinguishes a liver abscess from one of subphrenic origin. Emphasis is laid upon the occurrence of an abscess of such a large size in one who had never suffered from dysentery.

P. H. M-B.

Bablet (Jean). **Lésions histologiques dans un cas d'hépatite amibienne.**—*Arch. Inst. Pasteur d'Indochine.* 1925. Apr. No. 1. pp. 38–41. With 7 figs. on 3 plates.

A description of the pathology of a case of amoebic hepatitis which developed with great rapidity in an Annamite. At autopsy fluctuating abscesses the size of small hazelnuts were scattered throughout the liver. Microscopic examination of the necrotic areas (illustrated in 3 excellent plates) show an almost complete absence of leucocytic infiltration. At the margins of the necrotic zone indications of a fibrous capsule can be made out. The amoebae themselves are

present in large numbers in curiously conscribed collections, but are only to be seen in sparse numbers in the centre of the necrotic tissue itself. The parasites have large well-marked nuclei and vacuolated protoplasm. The remainder of the paper concerns itself with theoretical considerations upon the entry of the entamoebae into the portal system and its consequent spread throughout the liver.

P. H. M-B.

FRANCHINI (Giuseppe). **Su di due casi di cistite amebica.**—*Pathologica.* 1925. May 15. Vol. 17. No. 396. pp. 271–273. With 1 text fig. [2 refs.]

The first case is that of a woman of 28 years who for three years had had dysenteric symptoms and for two years had at intervals passed blood-tinged, turbid urine, in which amoebae resembling *E. histolytica* were found; the condition, both intestinal and urinary, cleared up with emetine injections, but relapsed. The second was a man, aged 43 years, who showed no intestinal symptoms, though a few amoebae were found in his stools together with Giardia and its cysts and Blastocystis. The urine showed the same features as in the other case. The author mentions the possibility of the urine of the first patient being contaminated by the entamoeba from the bowel, but in the second this was definitely excluded.

H. Harold Scott.

PETZETAKIS. **A propos des amibes rencontrées dans les cystites amibiennes. Présentation des microphotographies des amibes.**—*Rev. Méd. et Hyg. Trop.* 1925. May-June. Vol. 17. No. 3. pp. 141–146. With 3 text figs. [11 refs.]

The author describes the amoeba which he has found in cases of pyocystitis under the name of "Entamoeba polymorpha." It varies in size from 15-45 centimetres (?); its movements are usually very active, and, as a rule, it ingests red blood corpuscles. The staining of these organisms is more difficult than of those present in the stool; sometimes they possess two, or even three, nuclei.

[The paper is illustrated by three microphotographs, the last of which is said to portray an Entamoeba as it occurs in dysenteric faeces. In each case the organisms are in the quiescent and circular stage; and they by no means convince the sceptical observer.]

P. H. M-B.

PETZETAKIS & PETRIDIS (G.). **Bilharziose et amibiase urinaire.**—*Rev. Méd. et Hyg. Trop.* 1925. Jan.–Feb. Vol. 17. No. 1. pp. 23–25. [3 refs.]

Case of a man of 25 years who had suffered for two years from haematuria and a cough with vague thoracic pains and slight mucopurulent expectoration. Examination of sputum and of urine revealed living amoebae, and in the latter a few ova of *Schistosoma haematobium*. The amoeba was 15-20 mm. in diameter with clear differentiation of ecto- and endoplasm, and several contained erythrocytes. There were no amoebae in the faeces. They disappeared after administration of emetine, though the bilharzia ova persisted.

H. Harold Scott.

DEGORGE (A.). **Appendice ulcéré et rempli de pus dans un cas de dysenterie amibienne.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1924. Apr. Vol. 2. No. 4. pp. 74–76. [1 ref.]

The author describes an appendix removed at operation from a case of amoebic dysentery. It was distended with thick yellow pus and contained an elliptical ulcer about 2 cm. in length; the mucous membrane was red and oedematous. No entamoebae were found in the pus. During the height of the illness which, unfortunately, proved fatal, the inflammation of the appendix had given rise to few, if any, signs.

P. H. M-B.

CHAUFFARD (A.) & CLÉMENT (Robert). **Grand abcès amibien du foie guéri par le traitement médical.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. May 7. Year 41. 3rd Ser. Vol. 49. No. 15. pp. 646–648. [2 refs.]

The authors relate the clinical history of a well-marked case of hepatic amoebiasis. The patient was admitted to hospital in February, 1925, with a much enlarged liver (measuring 21 cm. in nipple line), leucocytosis of 12,600, pyrexia, etc. Pleural and peritoneal friction sounds were present, and exploratory pleural puncture yielded a clear serous fluid containing endothelial and polymorphonuclear cells. Treatment consisted of daily emetine injections of 0·08 gm., followed by stovarsol 0·50 gm. daily. The patient made a complete clinical recovery. A point of interest in this case is the latency of the infection, for 12 years had elapsed since the dysenteric attack. They consider that a large abscess was certainly present, and that the pleuritic fluid was due to an amoebic pleurisy. The fact that the vertical diameter of the liver shrank from 21·14 cm. within 5 weeks is taken as proof of clinical cure. They think that in future surgical intervention in these cases will be the exception, and comment favourably upon the combined emetine and stovarsol treatment on which the patient gained 8 kilogrammes within a month.

P. H. M.-B.

RICCI (Angelo). **Contributo anatomo-patologico all'amebiasi intestinale ed epatica, curata con l'emetina.**—*Policlinico.* Sez. Prat. 1925. Mar. 23. Vol. 32. No. 12. pp. 414–420. With 2 figs. [53 refs.]

The case of a man with signs of hepatic abscess and with *E. histolytica* in the stools who was treated with emetine, 12 cgm. daily for five successive days; the course was repeated at intervals twice. Thirty-seven days afterwards the patient contracted lobar pneumonia and died. Post-mortem findings revealed an abscess at the upper part of the right lobe of the liver, the size of a lemon, with thick, fibrous walls, the fluid containing besides detritus and pus cells, crystals of haematoidin, cholesterin and Charcot-Leyden crystals, but no amoebae. MATTEI reported a similar case in 1917, and the author wonders whether the emetine, having been given in rather large doses and being eliminated by the respiratory tract, may not have paved the way for the fatal pneumonia.

H. Harold Scott.

DARGEIN & DORÉ (G. R.). **Amibiase pulmonaire gauche pure guérie par l'émétine et le stovarsol.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris* 1925. Apr. 9. Year 41. 3rd Ser. Vol. 49. No. 13. pp. 590–594.

The authors say that they cannot absolutely vouch for the amoebic origin of this case, as it was impossible to find the entamoebae in the sputum, but they point to the indisputable rapidity and efficacy of anti-amoebic treatment. The patient, a man 40 years of age, when first

examined, had signs of congestion of both bases. Signs of consolidation then appeared at the left base with blood-stained expectoration, and moderate pyrexia. On aspiration clear fluid was removed from a dull area in Traube's space. After the expectoration of much chocolate-coloured sputum the empirical injection of emetine was commenced. After a total of 0·48 gm. expectoration ceased, and the pulmonary signs disappeared. A relapse took place eleven days afterwards, again with expectoration of fluid chocolate pus in which no evidence of destruction of liver cells was obtainable. Emetine therapy was once more followed by favourable results. The authors consider that the signs warranted the assumption of spontaneous abscess formation at the base of the left lung with signs of pulmonary congestion and pleurisy. No history of dysentery was obtainable, nor could direct evidence of amoebae be obtained, but these organisms are probably less numerous in pulmonary than in hepatic pus, where also they may be scarce enough. It is possible that this is an example of autochthonous amoebic abscess of the lung; hepatic abscesses of a similar nature have been previously reported from Toulon

P. H. M-B.

JOHNS (F. M.) & JAMISON (S. Chaille). **A Preliminary Note on the Treatment of Amebic Dysentery with Stovarsol.**—*New Orleans Med. & Surg. Jl.* 1925. May. Vol. 77. No. 11. pp. 469–471. [6 refs.]

The authors have treated 27 cases of amoebic dysentery, both chronic and severe, with stovarsol. The disease had lasted from a few weeks to 25 years. In all cases the diagnosis was confirmed by the discovery of entamoebae in the stools or in scrapings of the bowels made through the proctoscope. The stovarsol, administered in 0·25 gm. doses three times daily for one week, brought about complete subsidence of the symptoms on about the third or fourth day. In one case encysted entamoebae were found on the 15th day following stovarsol treatment, and in a second a clinical relapse took place on the 16th day. Three patients have remained well, and free from entamoebae up to the present time (99, 74 and 70 days) after one course of treatment; two of them received seven injections (1 gr.) of emetine. The remainder received a second course of stovarsol seven to ten days after the first, consisting of three 0·25 gm. tablets per day for 7 days or two tablets daily for 12 or 14 days.

Up to January 20, 1925, the authors have been able to follow 20 cases accurately controlled for a period of 55 days. Of these 16 have remained well and free from entamoebae, and 4 have relapsed, 3 in a clinical sense and 1 by passing cysts. It is hoped that when the tolerance of this drug is more accurately known, it can be given over longer periods with even better results.

In the discussion Dr. GESSNER described the occurrence of a measles-like rash after exhibition of the drug resembling the transient arsenical rash sometimes observed after the injection of salvarsan. Dr. LEVIN described a chronic case of intestinal amoebiasis in which apparent recovery took place on stovarsol, in 8 gr. doses daily, after two days; but he thinks that it is still too early to state whether stovarsol eradicates amoebic infection. In flagellate infection stovarsol is very effective, but has no influence upon strongyloides or ancylostomes. Dr. C. C. BASS considers the effects of stovarsol treatment superior to any previously obtainable with emetine.

P. H. M-B.

JOHNS (Foster M.) & JAMISON (S. Chaille). **The Treatment of Amebiasis by Oral Administration of Stovarsol. (Acetylamino-hydroxyphenylarsonic Acid).**—*Jl. Amer. Med. Assoc.* 1925. June 20. Vol. 84. No. 25. pp. 1913–1914. [6 refs.]

The results of treatment with stovarsol in 46 patients have been eminently satisfactory, complete relief of all dysenteric symptoms in all patients being experienced within a period of three to six days on the administration of 0·5-1·0 gr. of stovarsol by the mouth daily. In clinical severity these cases ranged from acute fulminating infections with thirty and forty blood and mucus stools daily, down to the very chronic variety. The treatment has been found especially advantageous in patients with severe cardiac lesions, in pregnant women and in small children.

In a series of 27 patients, 4 were apparently cured by the administration of 0·75 gm. of stovarsol daily for 7 days ; 16 by two such courses, with a 7-day rest between ; one with three courses ; four with four courses and one with seven, while one relapsed frequently in spite of eight courses.

Twenty-one have remained free from all symptoms and parasites for an average of 3·8 months, 6·5 months being the maximum.

The simplicity of the administration of this drug compares very advantageously with former methods.

The experimental administration of three times the maximum kilogram-dose of stovarsol to a dog for one month was not followed by any demonstrable tissue changes in the organs.

P. H. M-B.

PETZETAKIS. **Le stovarsol dans la crise aigue de la dysenterie amibienne, la lambliose et autres parasitoses intestinales ; son action preventive probable contre l'infection amibienne.**—*Presse Méd.* 1925. Mar. 7. Vol. 33. No. 19. pp. 299–301. [1 ref.]

An extensive trial of stovarsol has been made in Alexandria. The records of three cases of acute amoebic dysentery are given. Stovarsol is exhibited in three tablets daily, comprising 0·75 gm., and, as a rule, the treatment is spread over 8, occasionally 16 days. After the third or fourth day a great improvement in the stools takes place. One chronic case is reported in which stovarsol failed and emetine given subsequently succeeded. Citing a number of clinical records the author believes that stovarsol is an excellent remedy for parasitic infections of the intestinal tract. It is well tolerated in doses of ½-1 gm. daily for adults. During the acute attack of amoebic dysentery it seems to act in the first 48 hours, in others it is necessary to increase the dose, and, finally, there is a residue in which it appears to have no action. In chronic or relapsing cases it is necessary to persist in the treatment, and in these it is advisable to combine stovarsol with emetine injected intramuscularly or intravenously ; but, in contrast to the latter drug, it may be exhibited over prolonged periods without any ill-effects. The general health appears to be much improved by its use. In children who cannot tolerate emetine it is invaluable. The daily doses are as follows :—

Up to 1 year	...	0·05-0·08 gm.
1-2 years ...	...	0·08-0·10 gm.
2-3 years ...	...	0·10-0·15 gm.
3-5 years ...	...	0·15-0·25 gm.

The treatment should be persisted in for 5-6 days and recommenced after an interval of 2-3 days. A few cases of infection with lamblia and trichomonas seem to show that it is equally efficacious against these parasites. Possibly stovarsol exerts a prophylactic action against amoebic dysentery, and one experiment is cited in support of this claim. A volunteer was obtained who swallowed dysenteric material containing amoebae and cysts in capsules each containing 1 cc. of the material. He was treated with four tablets of stovarsol daily for three consecutive days (*i.e.*, 1 gm. daily). No dysenteric symptoms or other ill results ensued.

P. H. M-B.

SPENCER (J. Heatley). **Stovarsol in the Treatment of Amoebiasis.**—*Jl. Roy. Army Med. Corps.* 1925. Mar. Vol. 44. No. 3. pp. 216–217. With 1 chart in text.

Some preliminary observations of the results of stovarsol treatment in intestinal amoebiasis are given. The first case was a chronic dysenteric passing cysts. Emetine and emetine-bismuth-iodide treatment proved unavailing and the amoebic dysentery recurred. Stovarsol was then commenced, and 144 grains were given within 12 days. Frequent tests have been performed since, and he has remained free from all symptoms for six months. Giardia cysts, however, still persisted.

The second case was one of amoebic hepatitis with a high persistent leucocytosis which did not yield to emetine, but a rapid and striking improvement took place as soon as stovarsol was given—gr. 8 per diem —total of 56 gr.

The third case was one of amoebic dysentery in a child, aged 2½. Emetine in ¼ gr. doses daily failed to affect the entamoebae, and was followed by stovarsol—gr. 1 daily for 12 successive days. Ten days later the amoebae reappeared, but were finally removed by a further 6 gr. of stovarsol. No further symptoms have been noted.

Two more cases are recorded, in which the records are not quite so satisfactory, though the drug appears to have a direct action also upon trichomonas.

P. H. M-B.

BEIJNEN (G. J. W. Koolemans). **De behandeling der amoebendysenterie.**—*Herinneringsbundel Inst. v. Trop. Geneesk. Leiden.* 1924. pp. 80–89. [10 refs.] English summary pp. 90–91.

Thirty-one cases of amoebic dysentery were treated by yatren. Of these 22 were cyst-carriers, but nearly all had suffered repeatedly from amoebic dysentery; the other 9 were passing active amoebae. The treatment consisted in giving three times a day, for 10 days, a capsule containing ¾ or ½ gramme of yatren. After the treatment the stools were examined regularly every fortnight for a period varying from two months to a year and a-half. Of 17 cases controlled in this way in only one did cysts reappear after a month; no relapses were observed during the observation. The author concludes that yatren is a very efficient drug in treatment of amoebic dysentery and should be given by the mouth as indicated.

P. H. M-B.

VIALARD & DARLEGUY. **Traitement par le dérivé formylé de l'acide méta-amino-oxy-phénylarsénique de quelques cas d'amibiase chronique.**—*Presse Méd.* 1925. June 6. Vol. 33. No. 45. pp. 748–749. [1 ref.]

In chronic cases of amoebiasis treparsol has a rapid and astounding action and, moreover, a distinct stimulating effect in contrast with the depressant action of emetine. Three tablets are given daily for a week or more, a total of 5·25 gms. The author has no doubts about the amoebicidal action of the drug, and, although it contains 28·75 per cent. of arsenic, it is well tolerated by the liver. He thinks the results are more or less permanent. Details of five cases are given.

P. H. M-B.

CHIANG (S. F.). **The Rat as a Possible Carrier of the Dysentery Amoeba.**—*Proc. Nat. Acad. of Sciences, U.S.A.* 1925. May 15. Vol. 11. No. 5. pp. 239–246. With 2 plates. [5 refs.]

From experiments here fully and satisfactorily described the author makes the formal conclusion that *Entamoeba histolytica* of human origin can be transmitted to white rats either by rectal inoculation of material containing trophozoites or by feeding with material containing cysts. He shows that the amoeba from the experimentally-infected rat is typically pathogenic to kittens; also that clean rats associated with the experimentally infected rats become infected. The infection of rats experimentally infected may persist for at least four months. The results of this investigation incriminate the rat as a possible carrier of *E. histolytica.*

Incidentally, the author discovered white rats naturally infected with an amoeba (*Entamoeba histolytica murina*) which, if not identical with *E. histolytica*, cannot be discriminated with certainty; it is very readily cultivated on the medium described by BOECK and DRBOHLAV and encysts readily when the liquid of the modified medium described below reaches suitable concentration by evaporation; and it can be transmitted to kittens, to which it seems to be only mildly pathogenetic.

An amoeba similar to *Endolimax nana*, but possibly biologically distinct, has also been discovered in laboratory rats, and is here provisionally named *E. ratti.*

With regard to the methods of cultivation described by BOECK and DRBOHLAV, and followed in this study, the author notes a modified medium in which 100 cc. of beef-broth is substituted for 25 cc. of Locke Ringer solution in the preparation of the egg-slant, and the serum is omitted from the fluid subsequently added.

A. Alcock.

PETZETAKIS. **Recherches expérimentales sur le rôle pathogène des amibes des crachats dans la bronchoamibiase.**—*Rev. Méd. et Hyg. Trop.* 1925. May-June. Vol. 17. No. 3. pp. 136–139.

Recent experiments are recorded of inoculations of cats *per rectum* with the amoebae in the sputum of bronchoamoebiasis. The sputa were collected in a sterile Petri dish, mixed with sterile saline and injected with a catheter and attached syringe. The first animal died 11 days after injection with the symptoms of acute dysentery and

characteristic appearances of the large intestine. Amoebae are said to have been found in the stools. The second cat also died, but was not examined.

In two of three other animals infected at a later date the anus was sutured. The characteristic intestinal lesions were observed and in one three minute pin-head abscesses. Four out of the ten showed no symptoms of any kind. No microscopic sections of the diseased tissues appear to have been made.

P. H. M-B.

Lwoff (A.). **Chytridinées parasites des amibes de l'homme. Possibilité de leur utilisation comme moyen biologique de lutte contre la dysenterie amibienne.**—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 18–23. With 4 figs. [6 refs.]

The author describes and figures the Sphaerita which has been observed by various writers cited in the active forms—but never in the cysts—of *Entamoeba coli, E. nana,* and *E. histolytica* (as well as in some free-living amoebae). The amoeba ingests the spore of the Sphaerita and is inhibited from encystment and ultimately killed by the growth and multiplication of the Sphaerita. The author seriously propounds the utility of Sphaerita in the treatment both of amoebic dysentery and of cyst-carriers.

A. Alcock.

Hall (James H.) & Reed (Alfred C.). *Endameba coli.* **A Clinical Study.**—*Jl. Amer. Med. Assoc.* 1925. June 20. Vol. 84. No. 25. pp. 1914–1915. [1 ref.]

Reed has for some time held the opinion that *Entamoeba coli* may be potentially pathogenic ; its capacity for damage to its host may be due to direct damage to the mucosa, to irritation causing reflex symptoms, or to disturbance of digestive processes. The complaints and symptoms of patients harbouring this parasite were variable and indefinite and usually described as neurasthenia. The treatment included three doses of neo-arsephenamin, ten doses of emetine hydrochloride, and 30 grs. of E.B.I. By these means *E. coli* can be eradicated in the same way as *E. histolytica.*

P. H. M-B.

Bercovitz (Nathaniel). **Viability of Cysts of Human Intestinal Amoebas as determined by Exposure to Various Substances and Subsequent Staining in Haematoxylin.**—*Univ. California Public. Zool.* 1924. Sept. 17. Vol. 26; No. 13. pp. 249–261. [3 refs.]

The manure-value of faeces is not destroyed by septic tank treatment, and the author's experiments were undertaken to ascertain whether the value would be affected by such modifications of the treatment as should destroy parasites in the faeces—in particular encysted amoebae. From his experiments here recorded he makes a half-hearted conclusion that " if morphology be any guide " cysts of *E. coli* and *Councilmania lafleuri* [if these be distinct] are killed by " bichloride of mercury, carbolic acid, lysol, or formalin all in strength of 1 per cent., or with brine half strength," in one hour. Circumstances precluded continuation to the main object of the investigation.

A. Alcock.

i. Wahlberg (Johannes). **Två fall av amoebiasis.** [Two Cases of Amoebiasis.]—*Finska Läkaresällskapets Handlingar.* 1924. July-August. Vol. 66. pp. 539–549. With 1 fig. [14 refs.]

ii. Galmozzi (F.). **Contributo allo studio delle amebiasi autoctone.**—*Giorn. di Clin. Med.* 1925. Feb. 28. Vol. 6. No. 3. pp. 104–111.

iii. Gioseffi (M.). **Forme di sporulazione della** *amoeba hystolitica* **Schaudinn nel sangue circolante.**—*Riforma Med.* 1925. Mar. 23. Vol. 41. No. 12. p. 276. [13 refs.]

i. The two cases described appear to be the first of tropical amoebic dysentery that have occurred in Finland. The first case was a man of 34 who had previously been living in S. Australia for a couple of years. The second case was a sailor of 36. He first fell ill on a boat off the African coast.

E. E. Atkin.

ii. This paper reviews once again the question of indigenous amoebiasis in Italy, largely from the records of cases by previous writers, but to this list are now added seven more.

iii. The author says that in 1910 he found sporulating forms of *E. histolytica* in the blood as well as in the dejecta.

H. Harold Scott.

Bacillary Dysentery.

Connor (Roland C.) & Bates (Lewis B.). **A Clinical and Bacteriological Analysis of the Bacillary Dysentery Cases in Ancon Hospital during the Past Five Years.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 410–421. [3 refs.] [United Fruit Company, Boston, Mass.]

Bacillary dysentery occurs frequently in localities where sanitation is defective. The Canal Zone and the adjacent cities of Panama and Colon are directly under the supervision of the Health Department, so that lack of sanitation as a causative factor in this locality can be eliminated. This applies to the water supply, sewage disposal and flies. The milk supply for the Canal Zone has been pasteurized during the whole of the five-year period. The spread of bacillary dysentery in the Zone and adjacent cities must, therefore, be wholly due to carriers. The first outbreak occurred in 1918 amongst the nurses at Ancon Hospital. Ten infections with *B. dysenteriae* were recorded, three of which were severe. The source of infection was successfully traced to a carrier. During the five-year period 1919–1923 routine stool cultures have been made on all cases of enteritis and enterocolitis, and 66 cases of bacillary dysentery were diagnosed and treated. The ages of the patients ranged from 3 months to 59 years. The average time spent in hospital was 15·8 days. There were 19 deaths, all in infants and children under 6 years of age; 6 occurred within 24 hours of admission. The average monthly incidence was higher in February and March, both dry-season months, than in May and June, the first two rainy months of the year.

For several years the authors have classified and designated dysentery bacilli by the group system recommended by Thjøtta; three groups, the Shiga, Flexner, and Sonne, being recognized. Of the Shiga (Group I) 4 cases were recognized, of the Flexner (Group II) 39, and of the Sonne (Group III) 18. Ten per cent. of cases would not have been detected had they not come to autopsy. A variety of intestinal

disorders may be mistaken for bacillary dysentery. A child admitted to hospital with high fever, convulsions and diarrhoea should be suspected of having this infection. Children are more susceptible than are adults, and the disease is usually more fatal to them, and it is more difficult to prevent cross-infection in children's wards.

The authors believe that carriers are entirely responsible for the spread of the disease in the Canal Zone, and they cite the case of a soldier who was first recognized as a carrier over a period of 4 months, of the Flexner bacillus, but subsequently developed clinical dysentery. They believe that the convalescent carrier is the common factor, but the healthy carrier is not negligible. They conclude by stating that the disease does not receive in tropical America the attention which its frequent occurrence merits.

P. H. M-B.

TROUDE (M.). **Etude épidémiologique sur la dysenterie à l'armée du Rhin de 1919 à 1924.**—*Rev. d' Hygiène.* 1925. June. Vol. 47. No. 6. pp. 490–513. With 1 map. [3 refs.]

Bacillary dysentery is endemic in the Ruhr district and cases occurred amongst the Army of Occupation there, but in nothing like the same proportion or intensity as during the period of hostilities. The first epidemic here described lasted from July to October, affected some 80 cases, and caused three deaths, the causative organism being Flexner's bacillus. It coincided with a similar epidemic amongst the civil population, and the greatest number of cases occurred in troops which were in close contact with the civilians. During the autumn of 1921 a recrudescence was noted in the neighbourhood of Düsseldorf with a total of 318 cases, the majority due to Shiga's bacillus. No dysentery was notified in 1922, but the figures rose to 392 in 1923 and 80 in 1924. The Rhine district accounted for the great majority of the cases. The symptoms were classical and articular rheumatism was noted. The gravity was feeble compared with that of the epidemic among the civilians. In treatment stress was laid upon the injection of antidysenteric serum, to which little value was attached by the Germans.

Contrary to war experience, cases continued to crop up during the winter season. Amongst prophylactic measures the greatest importance is attributed to the oral vaccination of BESREDKA. At an estimate nearly 3,000 men were vaccinated by this method in the Army of the Rhine in 1923 and 1924, and not a single one contracted dysentery.

P. H. M-B.

HUEBSCHMANN (P.). **Beiträge zur Bakteriologie und pathologischen Anatomie der Ruhr.** [Bacteriology and Anatomic Pathology of Dysentery.]—*Virchows Arch. f. Path. Anat. u. Physiol.* 1925. Feb. 24. Vol. 254. No. 3. pp. 811–829. [40 refs.]

This paper is founded upon material collected in the epidemic outbreak of bacillary dysentery in Leipzig in 1917. The author is by no means convinced that the bacilli hitherto described are responsible for all cases of bacillary dysentery. Of 100 strains of dysentery bacilli isolated, two-thirds conformed to the Shiga-Kruse type and a much smaller proportion to the Flexner type. Others he was unable to

classify so accurately, and he emphasizes once more the difficulties of this hackneyed subject. In explaining the pathological appearances of dysentery the author believes that the infection is contracted *per os*, and owing to dyspepsia and exaggerated peristaltic action the organisms escape the destructive action of the gastric juice and affect those parts of the large intestine in which the faecal contents are held up, as, for instance, the caecum, the flexures and the rectum. The inflammation of the lymphoid tissue in the intestine, which is regarded by some authorities as the primary, he considers as a secondary manifestation. Adenomatous downgrowths of the epithelium are commonly observed in bacillary dysentery in children, and one case of polypoid inflammation has come under his notice.

P. H. M-B.

Brokman (H.) & Przesmycki (F.). **Sur la susceptibilité individuelle à la dysenterie.**—*C. R. Soc. Biol.* 1925. Apr. 3. Vol. 92. No. 12. pp. 989–991 [1 ref.]

Brokman (see this *Bulletin*, Vol. 21, pp. 37/352) has already described a cutaneous reaction following intradermal injection of Shiga-Kruse toxin. In persons in good health the reaction is positive in 80 per cent. of cases and negative in 20 per cent. A positive reaction is revealed by a red inflammatory zone which appears 24–48 hours after injection. A local necrosis of the upper layers of the skin may appear in people who have previously been injected with antidysenteric serum. The underlying reaction is probably the same as in the Schick test, and indicates an affinity of the human tissues for the toxin in question and is an expression of normal susceptibility. The positive reaction depends upon the toxic element, because should it be heated to 100°C for 10 minutes, or be neutralized by antidysenteric serum, no reaction occurs. 800 individuals have now been examined, and the reaction appears to be influenced by age. Newly-born infants give reaction less readily than those in their second year. After this age the percentage of positive reactions diminishes. Experiments on mice with the serum of susceptible persons seem to prove that it exercises a protective action in neutralizing the dysenteric toxin. Those mice, injected with the serum of men who gave no reaction and inoculated subsequently with toxin, all died. The physiological immunity in dysentery appears to be the same as in diphtheria, and lies in the hereditary capacity to produce normal antitoxins.

P. H. M-B.

Enlows (Ella M. A.). **Vaccination by Mouth against Bacillary Dysentery.**—*Public Health Rep.* 1925. Apr. 3. Vol. 40. No. 14. pp. 639–649. [23 refs.]

The method of vaccination by the mouth is not new, for it was used more than 19 years ago to produce immunity in Shiga dysentery. Besredka's experiments went to show that it is facilitated by the use of bile as an erosive agent. In the experiments here related, the vaccine was readily introduced, either through a small zebra catheter, or by pipette or syringe; no food was given for 18 hours prior to its administration. Mortality is lessened if cultures not more than six hours old are used, and suspensions of dried organisms appear to be

preferable, as the toxicity is less variable. The initial dose for vaccination *per os* should be 2,000,000,000 organisms in each cc., the suspension having the turbidity of 1,000 parts per million. In some of the experiments the vaccinating doses were given on three successive days with a 7–10 day interval, followed by three or more daily doses and a test dose 10–18 days later. In some cases the bile was given a day before, in others, a few minutes before the ingestion of the culture. A few experiments were made with Flexner's bacillus, in which very much larger doses can be used than of Shiga. A table is given of 166 rabbits vaccinated by various routes and the protection thereby obtained. Of 106 vaccinated by the mouth 57 per cent. survived; of 28 vaccinated intravenously 45 per cent.; of 32 vaccinated subcutaneously 70 per cent. Whilst the greatest degree of protection is afforded by the subcutaneous route, 57 per cent. is a very encouraging figure for the oral method. In order to test whether bile is necessary for the development of oral protection, experiments on 92 animals were undertaken; out of 63 rabbits to whom beef bile was administered 49 per cent. survived; but out of 29 animals without bile 59 per cent. As regards comparative toxicity of the three methods, the intravenous is naturally the most dangerous, as the greatest amount of toxin is thereby absorbed, but there appears to be no great difference between the other two methods. The final conclusion is that since at least some immunity follows vaccination by the mouth that method is worthy of further trial.

P. H. M-B.

Costa (S.), Boyer (L.) & van Deinse (F.). **Vaccination antidysentérique (bacille de Flexner) collective, par la voie digestive.**—*C. R. Soc. Biol.* 1925. June 19. Vol. 93. No. 21. pp. 122–124.

In an outbreak of Flexner dysentery on board a training ship of the Dutch Navy, fifty cases developed and others after arrival in port; immunization of the remainder of the crew was therefore attempted. The vaccine consisted of a culture of a 24-hour-old broth-culture sterilized at 60°C. for an hour. The vaccine, in doses of 1 cc. on each of three consecutive days, was administered to the whole crew, totalling 348 men, three hours after breakfast, and, at the same time, in order to judge more fully the full effect, the hygienic restrictions which had been formulated were temporarily abrogated. The vaccine did not cause any disagreeable symptoms. The same dose was administered to the sick as to the healthy, but no exacerbation or dysenteric symptoms were recorded. The epidemic was suddenly arrested, and after the date of the last dose of vaccine only one mild case of dysentery occurred. Discounting all other extraneous factors, the extinction of the epidemic must be attributed to the vaccine.

P. H. M-B.

Calalb (G.) & Ionesco (V.). **Sur un cas de pyélonéphrite à bacilles dysentériques.**—*C.R. Soc. Biol.* 1925. May 29. Vol. 92. No. 18. pp. 1460–1461. [1 ref.]

Pyelonephritis due to dysentery bacilli is a rare condition. One such case was observed in Roumania in a young primipara who was attacked in the eighth month of pregnancy with the customary symptoms of this affection and daily fever accompanied by a definite leucocytosis. In cultures made from catheter specimens at five-day intervals an organism

was recovered which gave the correct cultural reactions of Flexner's bacillus ; it was agglutinated by an anti-Shiga serum as well as by an anti-Flexner. The patient recovered on an autogenous vaccine.

P. H. M-B.

Cruz (J. da Costa). **O emprego do bacteriophago no tratamento das dysenterias bacillares.**—*Sciencia Medica.* 1925. Feb. 28. Vol. 3. No. 2. pp. 153–157. [1 ref.]

In the treatment of dysenteries the author brings forward evidence that for those cases designated "oligotoxic," associated with Flexner, Hiss-Russell, and Strong's types of organism, bacteriophage is the method *par excellence* [*ante* p. 22–23]. Thus, in one instance, a child of 11 years, very weak and ill (whose brother had died of the same disease, a Hiss-Russell infection, a few days previously, after ordinary treatment, including antiserum), cure resulted with marvellous rapidity after the administration of bacteriophage. Another patient felt so well on the day succeeding his first dose that he ceased treatment ; relapse came on two days later, but renewal of the treatment brought about a rapid cure. A third had been subject to relapses almost every month for two years ; finally, bacteriophage was tried, and in two days the patient felt well and for two years has had no recurrence. For Shiga infections the antiserum should be given as well, to counteract the toxic element, the bacteriophage being merely bactericidal.

H. Harold Scott.

Kusama (Hiroshi). **A Note on the Viability of** *Bacillus dysenteriae.*—*Philippine Jl. Sci.* 1925. May. Vol. 27. No. 1. pp. 1–7. [1 ref.]

These experiments were made with a recently isolated Shiga strain. From the behaviour of the organism in various media and when subjected to drying the following inferences are drawn : Unlike the cholera vibrio, the dysentery bacillus is fairly resistant to drying, and will survive longer in sterile than in normal fresh stool. *B. dysenteriae* will survive a considerable time in water, but longer in sea than in tap or distilled water. Physiological salt solution and bile are the best media for the survival of this organism in the stool, while the combination of the two may help to preserve the organism in the stools of dysentery patients and in carriers.

P. H. M-B.

Oerskov (J. L.). **Les bacilles appartenant aux groupes typhique, paratyphique, paradysentérique et** *coli*, **deviennent, après chauffage, hypersensibles à l'action de l'oxygène atmosphérique.**—*C. R. Soc. Biol.* 1925. Feb. 13. Vol. 92. No. 5. pp. 402–404.

In experiments on the thermo-resistance of organisms the author found a marked difference resulted, according as the organisms after heating were sown upon gelatin or bouillon in tubes. For instance, *B. paratyphosus* was found to be alive when inoculated into bouillon, after being heated for 20 minutes at 58°C., while on gelatin none grew after heating for six minutes. This is probably due to the fact that the organisms treated in this manner become hypersensible to the action of air. The paratyphoid organisms, as well as paradysentery and *B.*

coli are much more sensible to heat in open than in closed phials, and this fact should be taken into consideration in determining the thermo-resistance of these organisms.

P. H. M-B.

Melnik (M.). **Contribution à l'étude des relations entre les glandes à sécrétion interne et l'immunité. Le corps thyroïde et le bacille de Shiga.**—*C. R. Soc. Biol.* 1925. Feb. 27. Vol. 92. No. 7. pp. 474–475; and Apr. 3. No. 12. pp. 944–945. [1 ref.]

Rabbits weighing 2 kilogrammes were subjected to thyroidectomy. The animals stood the operation well and presented no untoward symptoms as the result. Five days after the operation the animals were inoculated subcutaneously with 2 cc. of a 24-hour culture of Shiga's bacillus in bouillon. Preliminary observations appear to support the idea that extirpation of the thyroid gland increases the bodily resistance to dysenteric infection. Nine animals were operated on and five were used as controls. Of the latter all died; of the former five only.

Continuing his researches on rabbits inoculated with dysenteric toxin four days after thyroidectomy, the author found that in eight such animals four survived, one died after 17, one after 16 days, one in 6 and one in 24 hours, whereas in six control animals, two died in 7, one in 6, one in 5, and two in 4 days. This experience confirms his conclusion that removal of the thyroid gland increases the resistance of the rabbit to dysenteric infection.

P. H. M-B.

Tupa (A.). **Contribution à l'étude des lésions du système nerveux central, provoquées par la toxine dysentérique.**—*C. R. Soc. Biol.* 1925. May 1. Vol. 92. No. 14. pp. 1141–1142.

Various investigators have recently described haemorrhagic lesions of the central nervous system in rabbits after the injection of dysenteric toxin. Repeating these experiments Tupa finds that Shiga toxins when injected intravenously in rabbits produce death in 1–8 days. It is remarkable that the greater number of animals die of nervous symptoms without showing any intestinal symptom. In one batch of 18 rabbits inoculated with dysenteric toxin, 12 died with nervous phenomena and lesions of the spinal cord, in two others both the cord and intestine were affected, while four succumbed without any macroscopic lesions. In a second series of nine rabbits inoculated with the same toxin, six were found to have combined intestinal and nervous lesions. Further experience of 200 rabbits has confirmed the facts stated above. The nervous lesions are confined to the cervical enlargement of the cord and the bulb. Seen by the naked eye the lesions of the central nervous system are hyperaemic and haemorrhagic spots, ranging in size from punctiform haemorrhages to lesions which involve the whole diameter of the cord. Two forms of lesions can be distinguished, one due to the action of the toxin itself, the other more severe and mechanical, due to destruction of the nerve fibres by the haemorrhagic effusion.

P. H. M-B.

Calalb (G.). i. **Recherches sur les races de bacilles dysentériques en Roumanie.** *C. R. Soc. Biol.* 1925. May 29. Vol. 92. No. 18. pp. 1455–1457.

——. ii. **Recherches sur les races de bacilles dysentériques atypiques isolées en Roumanie.**—*Ibid.* pp. 1457–1460.

i. In 400 cases of dysentery in Roumania seen in 1924, dysentery bacilli of typical or atypical strains were isolated in 73, or 18 per cent. This relatively small proportion is to be ascribed to the rather late period of the disease at which the examination was performed. Some of the specimens were sent by post from all parts of Roumania, and could not be plated out for 2 or 3 days. The Shiga bacillus was isolated in 16 cases; the Flexner bacillus in 15; the Y bacillus in 12, and Strong's bacillus in one.

ii. In this Roumanian epidemic 40 per cent. of the organisms isolated could not be identified by the customary tests and were inagglutinable. A classification into eight groups is proposed, according to the sugar reactions and the capacity for forming indol. Although in this respect the first four groups tallied with Schmitz's bacillus, yet they were not agglutinated by an anti-Schmitz serum. These paradysentery bacilli were never isolated in the primary stages of the illness; they appear at a time when the typical bacilli have vanished. In one instance, morever, the transformation of an authentic strain of Shiga bacillus into an atypical organism has been observed to take place. The author is of opinion that paradysentery bacilli are merely true dysentery bacilli altered by external circumstances.

P. H. M-B.

Suzuki (Tadashi). **Du sérum antidysentérique épuré.**—*Jl. Oriental Med.* 1924. Nov. Vol. 2. No. 4. French summary pp. 279–280. [In Japanese.]

These investigations were undertaken in consequence of the researches of Besredka, who demonstrated antitoxic bodies in the coagulated portion of the serum. 2 cc. of the coagulated antidysenteric serum of Besredka are emulsified in 20 cc. of sterilized distilled water, a dilution corresponding exactly with a similar amount of commercial antidysenteric serum. The author ascertained the lethal dose of Shiga bacilli for mice, which proved to be 0.3 cc. of a 24 hour culture of the bacillus, and injected five times this dose intraperitoneally, subsequently, in series, commercial antidysenteric serum, desiccated serum and Besredka's serum. Commencing with minute quantities, 0.0002 cc., he gradually increased it up to 0.5 cc. The following conclusions were arrived at:—

1. With commercial antidysenteric serum, 0·00625 cc. alone protected mice against 1·5 cc. of bacillary emulsion.

2. With desiccated serum diluted up to a concentration corresponding with commercial serum the same dose conveyed an equal degree of protection.

3. With Besredka's coagulated serum 0·025 had the same effect, but larger doses did not convey a parallel degree of protection.

4. The liquid antibody in the last preparation is less effective than in the commercial antidysenteric serum.

P. H. M-B.

O'Brien (R. A.) & Runge (B. F.). **The Standardization of Anti-Dysentery (Shiga) Serum.—II.**—*Brit. Jl. Experim. Path.* 1925. Apr. Vol. 6. No. 2. pp. 84–87. [1 ref.]

Details of methods employed for the standardization of antidysentery serum have already been published [see this *Bulletin*, Vol. 22, p. 22, Sudmersen, Runge & O'Brien, 1924] and the standard "toxin" and "anti-toxin" described. Commencing with their initial standards, the authors have now prepared a second toxin—3 A—which has been titrated against a test serum S. 9. The general scheme of the tests here described was to estimate three particular points, small numbers of mice being used. 18 commercial and standard antidysentery (Shiga) serums were tested in this manner. At the first point 80-100 per cent. of the mice are protected against the test-dose 0.2 mgm. of toxin; at the second point, between 20 and 50 per cent. are protected, and at the third, less than 20 per cent. These points represent roughly the L O and L+values of the serum. [These terms being convenient, but not being used in direct accordance with Ehrlich's definition.] Individual mice vary a good deal in their susceptibility to Shiga toxin, and also being delicate animals, they easily succumb to changes of temperature and feeding, so that it is difficult to assess exactly the intermediate point of toxicity. The provisional unit of serum recognized by these investigators is the amount which will neutralize the test-dose 0·2 mgm. of the standard toxin A.A. (approximately ten lethal doses). A table exhibits the results of titration of sixteen serums issued by various laboratories; the range of "values" obtained was found to be undesirably wide. At present it is possible for a clinician to purchase and use two samples of commercial serum of which, while bearing no indications on the labels, one would be 20 to 50 times stronger than the other in anti-toxin value. A final test was made with the object of ascertaining how accurately one could titrate the anti-toxic value of a standard serum if a moderate number of mice were used. From a review of the general results the opinion was formed that serums differing from one another by 20 per cent. in value might be distinguished.

P. H. M-B.

i. Wago (Heinosuke), Suga (Yoshihiko), Goto (Mototaka) & Suzuki (Yasukichi). [**On the Causative Agent of Pseudo-Dysentery, prevailing endemically in a Region around Shyonai, Yamagata Prefecture.**]—*Sei-I-Kwai Zasshi* (*Jl. of Sei-I Med. Soc.*). 1924. Dec. Vol. 43. No. 6. [Summarized in *Japan Med. World.* 1925. Mar. 15. Vol. 5. No. 3. p. 75.]

ii. Robinski. **Die chronische Ruhr.**—*Muench. Med. Woch.* 1925. Mar. 13. Vol. 72. No. 11. pp. 432–433. [5 refs.]

iii. Posselt (Adolf). **Ueber allgemeine Pathologie und spezielle klinische Fragen der enterogenen, speziel auf dysenterischer Basis entstandenen Magen- und Zwölffingerdarmgeschwüre.**—*Arch. f. Verdauungs-Krankht.* 1925. Jan. Vol. 34. No. 3/4. pp. 222–271. [Refs. in footnotes.]

iv. Bail (Oskar). **Entstehung und Gesetze van Bakterien-populationen; soziologische Studien an Dysenterie-bazillen.**—*Arch. f. Hyg.* 1925. Vol. 95. No. 1-2. pp. 1–39.

i. The authors claim in this paper to have discovered a new strain of dysentery bacillus distinct from anything hitherto described.

ii. This paper appears to contain no original observations. The author believes in the vaccine treatment of chronic bacillary dysentery and records the fact that this type of colitis is especially liable to a superimposed tubercular infection.

iii. In a long and discursive paper the author brings forward evidence for some connection between previous bacillary dysentery and the development of duodenal ulcer.

iv. A purely bacteriological paper. P. H. M-B.

Mixed and Unclassed Dysentery.

Cunningham (J.), Theodore (J. H.) & Krishnan (K. V.). **Further Observations on Latent Dysentery. The Practical Value of the Discovery of Latent Dysentery Cases as a Method of Dysentery Control.**—*Indian Jl. Med. Res.* 1924. Oct. Vol. 12. No. 2. pp. 375–389. With 4 charts. [3 refs.]

A previous communication on this subject has been reviewed (see this *Bulletin*, Vol. 21, p. 38). By means of 10–12 consecutive macroscopic examinations of the stools, each jail population was divided into two groups, a normal and an abnormal, according to the evidence obtainable during the course of the inspections. All cases showing mucus and blood received appropriate treatment. The dysenteric index (the percentage of latent dysentery) was as follows :—

Col. Bateman's series	...	...	27·0	per cent.
Bellary series	...	...	30·9	,,
Cannanore series	...	...	22·6	,,

In other words, one third of the communities was found to be infected. Proof of the practical value of segregation of latent dysentery is seen from the following statements :—

The dysentery rate in the community declined with great rapidity when once these cases had been brought under control.

In the Bellary and Cannanore series 92·5 per cent. and 94.5 per cent., respectively, of subsequent admissions for dysentery were divided from other groups suffering from latent dysentery, which had been previously isolated. A very considerable number of men—48 out of 184—in one instance who were working in the cook-house were discovered to be suffering from latent dysentery ; their detection and segregation resulted in great improvement in the general health of this community. The systematic macroscopic inspection of stools is the best and surest method of detecting cases. It is cheap and rapid and requires no special skill or apparatus.

P. H. M-B.

Bernard (P. Noël), Bablet (Jean) & Pons (René). **Les dysenteries en Cochinchine.**—*Arch. Insts. Pasteur d'Indochine.* 1925. Apr. No. 1. pp. 3–37. With 2 text figs. 2 figs. on 1 plate & 1 folding chart. [89 refs.]

In 1924, 2,101 faeces examinations 145 revealed *Entamoeba histolytica* ; in 86 dysentery bacilli were isolated, making a total of 231 definitely diagnosed. The reaction of normal and abnormal stools (made with blue and red litmus papers) resulted in the following figures :—

The reaction of 500 normal stools was : acid in 8 ; neutral in 77 ; alkaline in 15.

A control series of pathological stools gave an alkaline reaction in 75 per cent. of those containing blood and mucus; in semi-formed motions alkaline and acid reactions were recorded in almost equal proportions. The alkalinity of the stools is in direct proportion to the gravity of the case. In the great majority of cases the return to neutrality coincides with a great improvement of the gastro-intestinal condition.

From the coprological point of view the amœbic dysentery stool has four cardinal characters: (1) alkalinity; (2) abundance of red blood corpuscles; (3) paucity of leucocytes; (4) non specific bacterial flora not generally stained by Gram. In 2,101 examinations in 1924 active *Entamœba histolytica* were found on 104 occasions (*i.e.*, 5 per cent.), and the quadrinucleated cysts 41 times (*i.e.* 2 per cent.). Of these 2,101 stools 97 were frankly dysenteric. It is difficult to compute the mortality due to *E. histolytica*, but about 3 per cent. of the total deaths would seem to be a correct estimate.

In Saigon intestinal flagellates were encountered in 16·8 per cent. of diarrhœic states and acute exacerbations of amœbic or bacillary dysentery. *Lamblia intestinalis* cysts were found in water filters in Cochin China by Noc, demonstrating the part played by water in the spread of the disease. In the whole series Lamblia was found in 74 cases, mostly in alkaline stools. From the specialized life history of the parasite the authors believe that an alkaline medium is necessary for the development of lambliasis.

Balantidium coli was found once only, in a native who was suffering from vomiting and diarrhœa. Intestinal spirochaetes were found in the greatest numbers in stools, which were alkaline in reaction and contained blood and mucus. Their pathogenic rôle is neglible in the great majority of cases. The authors describe two forms, a long and a short variety of *Spirochaeta eurygyratum*, and think they may play a part in gangrenous enteritis.

As regards bacillary dysentery in 1924, dysentery bacilli were isolated in 11·2 per cent. of suitable stools, and of these 30·2 per cent. were Shiga, 28 per cent. Flexner and 26·7 per cent. Hiss bacillus. In Saigon Pons has described a dysenteric syndrome in children, associated with a cocco-bacillus. Researches on yeast isolated from diarrhœic conditions and dysenteric stools in Saigon indicate that these organisms played a secondary part in the production of the diarrhœa.

P. H. M-B.

O'Connor (F. W.). **The Electrical Sigmoidoscope in Tea Garden Practice. A Preliminary Note.**—*Proc. Assam Branch, Brit. Med. Assoc. Ann. Meeting Jorhat, 2nd Mar. 1925.* p. 29.

The author emphasizes in this paper the value of sigmoidoscopic examination in Tea-garden work, especially under circumstances where there is difficulty in obtaining stools for microscopic examination. In ten cases, recently observed, the evidence of a clinical cure appeared to be complete, though on osigmidoscopic examination ulceration was still present.

P. H. M-B.

HAUSMANN (Theodor). **Die absolut gute Prognose bei rigoroser, protrahierter, mit Nahrungsentziehung verbundener Abführbehandlung der Dysenterie.** [The Very Favourable Prognosis in Dysentery treated with Rigorous Prolonged Purgation and Starvation.]—*Arch. f. Verdauungs-Krankht.* 1925. Jan. Vol. 34. No. 3–4. pp. 193–221. [73 refs.]

The author bewails the fact that in recent papers by German writers upon the prognosis of dysentery, very little, if anything, is said of the different methods of treatment employed. So impressed is he with the efficacy of his " aperient treatment " that he has already stated in 1922 (see this *Bulletin*, Vol. 19, p. 704) that no one should die of dysentery, for during the last 20 years he has not had a fatal case or seen one lapse into the chronic stage. After discussing the pharmacological action of the various aperients generally in use, the author decides that none are so satisfactory as the salines, because they evacuate the large intestine so completely and bring about a transudation through the intestinal walls, which the others do not. A combination of aperients is most satisfactory. He therefore advises two doses of calomel powder 0·2 gm. at two hourly intervals, to be followed later by one teaspoonful of Ol. ric., and six hours afterwards sodium sulphate 25 gm. in half a glass of water. The motions at first faeculent soon become watery. In severe cases in order to make good the loss of fluid it may be necessary to resort to subcutaneous transfusion of Ringer's solution. Almost absolute starvation is necessary in order that the aperient treatment should be effective. For the first few days patients are not permitted anything more nutritious than tea and sugar, subsequently, various soups and meat infusions.

P. H. M-B.

SALMERÓN OLIVARES (J. M.). **Sobre alimentacion en la Disenteria aguda amibiana o bacilar.**—*Rev. Med. y. Cirug.* Caracas. 1924. July 31. Year 7. No. 76. pp. 177–185.

The views advanced by the author of this article on the feeding of dysenteric patients will probably meet with considerable opposition. After purging and giving serum or emetine, as the case may be, if the patient is " hungry for salt food " (" comida salada "), although the stools continue frequent, liquid, mucoid and blood-stained, and there is abdominal pain with fever and tenesmus, he allows the following, and affirms that he obtains excellent results and has not lost a patient : soup of green bananas, vermicelli or celery in fresh broth made from meat, chicken or pigeon, without fat, and seasoned with salt, garlic and onion. In two or three days he adds chicken, or pigeon, or loin of pork [!], avoiding fat, wheat or maize bread. Two or three meals are given daily, that much being eaten which leaves the patient still a little hungry. If this leads to increased peristalsis he gives opium or chlorodyne to control it.

H. Harold Scott.

HATAI (K.). **Ekiri (A Foudroyant Form of Dysentery in Children) in Dairen.**—*Jl. Oriental Med.* 1924. Nov. Vol. 2. No. 4. English summary p. 291. [In Japanese.]

This paper is based upon a special study of over 100 cases of ekiri, a fulminating form of dysentery in children. The author concludes that " ekiri " accounts for 29 per cent. of all cases of dysentery in Dairen ; it is most prevalent between the ages of 2 and 3 and is epidemic during

the months of June, August and September. The mortality rate is 43 per cent., the highest rate occuring between the ages of 3 and 4. From the stools of patients the author obtained dysentery bacilli in 14 per cent. The Y bacillus of the acid or mannite fermenting type was most prevalent, and then the Hiss and Flexner types.

P. H. M-B.

TANAKA (Toshiwo). **Ueber die Hirnsymptome bei der foudroyant verlaufenden Kinderdysenterie und Ekiri.** [Brain Symptoms in the Fulminating Dysentery of Children and Ekiri.]—*Mitt. a. d. Med. Fak. d. Kais. Kyushu-Univ.* Fukuoka, Japan. 1924. Vol. 9. No. 1. pp. 139–171. With 3 charts in text. [72 refs.]

Infantile dysentery and "ekiri" in the district of Fukuoka, Japan, are very frequently complicated by encephalitis, which has been observed in 26·5 per cent. of cases and is responsible for the sudden death which often takes place in the disease. Children of 3 and 4 years most frequently suffer from dysenteric encephalitis, which sets in early, not infrequently on the third day of the infection, sometimes within twenty-four hours, and runs a very rapid course; 63·3 per cent. of those attacked die in 3 days, the majority within 48 hours. No. 4 type of dysentery bacillus is the one most frequently associated with this encephalitis. One of the most frequent symptoms is the vomiting of coffee-grounds material. Epileptiform convulsions, spastic paralyses, aphasia and conjugate deviation of the eyes may all occur. Cases of encephalitis are most frequently observed in the summer months, July-September, at a time when dysentery and ekiri is most prevalent.

P. H. M-B.

KESSEL (John F.). **The Ingestion of Erythrocytes by *Trichomonas hominis* and its Occurrence in the Pus of an Amoebic Liver Abscess.** —*Jl. Parasit.* 1925. Mar. Vol. 11. No. 3. pp. 151–152. [4 refs.]

Specimens of *T. hominis* from the stools of a patient suffering from bacillary dysentery and of *T. vaginalis* from the urine of another patient, passed at the time of menstruation, were found to contain ingested red blood corpuscles. Later, in August 1924, in examining the pus from a long-standing abscess of the liver, operated on by Dr. LUDLOW, in addition to actively motile forms of *E. histolytica*, numerous active *T. hominis* were found, but on this occasion none contained red blood corpuscles. The author is unaware of a similar previous occurrence. These observations do not necessarily indicate that *T. hominis* is *per se* able to produce pathological conditions in man, but its ability to ingest red blood corpuscles suggests that, under certain conditions, it may become pathogenic.

P. H. M-B.

GARRETT (F. D.). **Some Obstinate Cases of Chronic Diarrhoea due to Infection of the Duodenum by *Giardia Intestinalis*.**—*Southwestern Med.* 1925. May. Vol. 9. No. 5. pp. 172–175. With 3 text figs.

Four cases are described.

In the first the patient, age 58, had lost weight, was anaemic, and had suffered from diarrhoea for 3 years. Transduodenal lavage with methylene

blue and acriflavin, alternately with hypertonic saline improved the condition, but did not dispel the Giardia.

In the second case the patient, age 51, had suffered from almost constant diarrhoea for 6 years. After being treated in vain with thymol, calomel, transduodenal lavage with methylene blue and acriflavin, and at length by cholecystectomy and appendectomy, he was put on thymol (50 gr. once a week) and sulphur (90 gr. daily at bed-time), along with transduodenal lavage with acriflavin (1 in 3,000 of hypertonic saline); and on this treatment the Giardia disappeared within a few weeks. In the third case, age 24, there was intestinal discomfort, accumulation of wind, and constipation; appendectomy had been done a year before without any effect. This case was also treated successfully with thymol and sulphur, and was reported well 10 months afterwards. In the fourth case, age 41, the symptoms—pain in the abdomen, diarrhoea, lassitude, nausea—had continued during 6 years; after thymol (50 gr. once a week) followed by transduodenal lavage, the patient began to improve on neosalvarsan (0·3 gm. weekly, intramusculare) and sulphur (90 gr. daily).

A. Alcock.

Fujii (Shyukiku). [**On the Influence of the** *Bacillus dysenteriae* **Shiga against the Sugar Concentration of Blood and the Cerebrospinal Fluid.**]—*Chugai Iji Shimpo* (*Central Med. Jl.*). 1925. Mar. Vol. 44. No. 5. [Summarized in *Japan Med. World.* 1925. May 15. Vol. 5. No. 5. pp. 127–128.]

SPRUE.

ASHFORD (Bailey K.). **Tropical Sprue in Porto Rico—A Synthesis of Fifteen Years' Work of Investigation and 2,200 Cases.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 686–700. [United Fruit Company, Boston, Mass.]

A number of observers consider sprue to be a state or condition, whilst the majority believe it to be a disease of unknown etiology, probably of microbic origin. There is reason to believe that the sequence of nutritional unbalance, digestive glandular incompetence, and a consequent fermenting mass of sugars, starches and fats affords the yeast-budding fungus, *Monilia psilosis*, a suitable medium for growth.

The exhaustion state is the usual predecessor of sprue. The leading features in 227 patients suffering from this condition were: disordered digestion with acid dyspepsia, constipation, a steady diminution in the size of the liver, a sallow complexion, lowered blood-pressure, asthenia and a moderate loss of weight. In 26 per cent. the tongue becomes sensitive to mild irritants, but there are rarely any lesions. There is also an indefinable irritability, vague pains in the body, and, occasionally, muscular cramps in the legs. A brownish-gray pigmentation over the malar prominences, forehead and cheeks may be noted. In none of these cases was *Monilia psilosis* found and all serological tests were negative. It is upon this background that sprue develops. The picture is now greatly enhanced; there is salivation and the passage of the large fatty stools. In 994 cases 40 per cent. complained of abdominal pain; 43 per cent. of nausea and 25 per cent. of occasional vomiting. There is probably no disease in which emaciation is greater and more rapid. At first the anaemia is secondary, but gradually the haemoglobin sinks, the colour-index rises and secondary blood-changes appear. In sprue and in pure nutritional unbalance there is a tendency towards retention of non-protein nitrogen and chlorides in the blood and a fall below the minimal normal of urea, uric acid and chlorides in the urine.

Of 1,435 cases of sprue, 1,202, or 83·7 per cent., were positive, mycologically, serologically, or both, for *Monilia psilosis*. Of 698 cases clinically free from any suspicion of sprue there were but 1.2 per cent. carriers. The author distinguishes between colonization and infection with *Monilia psilosis*. In sprue-cachexia it is much more difficult to find the organism, and serological tests are frequently negative. About three-quarters of the patients were between 20 and 60 years of age; children are much more frequently affected than has previously been supposed. In 1921 over 60 cases were in children under 10 years of age and four in children under one year. Out of 1,452 cases 59 per cent. were in females. Among 211 cases in which details of race were noted, there were 174 whites and 21 mulattoes, but no negroes. Sprue is rare in the full-blooded negro.

In Porto Rico sprue is distinctly an urban disease. Over 1,000 cases collected for this paper are inhabitants of San Juan, a city of 70,000 inhabitants. It is by no means a poor man's disease. The usually accepted relationship between sprue and dysentery is here denied. Amoebic dysentery practically does not exist where sprue is rampant in Porto Rico. The underlying predisposing factor is nutritional unbalance. The agricultural labourers are sustained by polished rice, beans, codfish, wild tubers, plantains and fruit. Fresh meat and milk

are very scarce. This diet constitutes a serious food deficiency. Another factor of importance is carbohydrate excess.

The remainder of the paper is devoted to a restatement of the claims of *Monilia psilosis* as the etiological factor in sprue.

P. H. Manson-Bahr.

Wood (Edward J.). **The Relation of Sprue and Pernicious Anemia to each other and to the** *Monilia Psilosis.*—*Southern Med. Jl.* 1925. Mar. Vol. 18. No. 3. pp. 157–161. [14 refs.]

No single description can fit all sprue tongues, for there are several types. Achylia gastrica occurs in a certain number of cases of sprue, but it is not universal; the author's experience is that it occurs in all when the disease is well established. The presence of achylia is put forward as one of the points of distinction from pernicious anaemia. The author asserts [quite wrongly] that the study of the anaemia of sprue has been neglected until quite recently. He knows of no disease which produces a greater degree of blood destruction. In addition to megalocytes, megaloblasts have been recorded in the blood. Neurological changes are not often recorded. A case is outlined in a woman from Porto Rico in whom symptoms of sprue and those of subacute combined degeneration of the spinal cord co-existed. The author records his growing conviction that *Monilia psilosis* is the cause of sprue. Recently he has recovered this organism from the faeces and from the gastric contents of a case of pernicious anaemia. In 24 cases of pernicious anaemia *Monilia psilosis* has been recovered from the pyorrhoeal pus in every case except those in which all teeth had been removed. Success in isolation depends upon the acidity of Sabouraud's medium. It must be titrated + 2 against phthalein indicator; high degrees of acidity tend to cause liquefaction of the agar. Guineapigs fed on cultures of *Monilia psilosis* lost weight and became anaemic. The red blood cells were profoundly affected and there was a reduction of haemoglobin of 15 to 20 per cent. The bone marrow showed corresponding changes. It is suggested that the toxins produced by *Monilia psilosis* are capable of producing definite haemolytic changes.

P. H. M-B.

Thomson (J. D.). **Some Analyses of Materials obtained from Sprue Cases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Jan. 15. Vol. 18. No. 7. pp. 381–382.

The analyses of sprue stools were undertaken to ascertain if the pancreas played any part in the disease. The proportion of neutral fat to fatty acid in normal stools is independent of the diet and remains practically constant in the ratio of 1 : 2. The organ chiefly concerned in the splitting of neutral fat is the pancreas. In pancreatic deficiency the proportion of neutral fat to fatty acid in the stools is increased—in extreme cases it may be 10 : 1 or 15 : 1. In sprue stools the proportion of fatty acid to neutral fat is increased. Analyses of seventy stools in a dozen well-marked cases of sprue showed this proportion to be on an average 4 : 1 or 5 : 1; in one case, during an exacerbation of symptoms, the proportion was 8 : 1. The weight of "total fat" (neutral fat and fatty acid) varied from 25–50 per cent. of the weight of the dried stool. To determine the part played by bacterial action in the excessive proportion of fatty acid over neutral fat, recently

passed stools were divided into two parts—one was submitted to analysis at once. while the other was incubated at 37°C. for 24–48 hours before the fats were extracted. The results were contradictory, but the experiments showed that bacterial action could not account for the large increase in the proportion of fatty acid to neutral fat in sprue stools.

The *diastatic reaction* of the urine was inclined to the low side, D=6·6 to 10 being a fair average. The activity of the *duodenal juice*. Samples were obtained, by means of Einhorn's tube, from two selected cases at intervals of a week or a fortnight and MacNeil's technique employed in testing. All three ferments, diastase, trypsin and lipase, were found to be normally active. There is no evidence of pancreatic excess; why then are the fatty acids not absorbed in the normal way to maintain the normal proportion of neutral fat to fatty acid? *Sugar tolerance* tests were undertaken to give some indication of the glycogenic function of the liver. There is no evidence of bile deficiency, for bile can be demonstrated in the duodenal juice. A degree of sugar intolerance, most noticeable during exacerbations of the disease, could be demonstrated. This pointed to a temporary inefficiency of the glycogenic function of the liver.

P. H. M-B.

Scott (H. Harold). **On the Value of the Estimation of the Ionic Calcium of the Serum in the Diagnosis of, and as a Gauge of Progress in Sprue.**—*Ann. Trop. Med. & Parasit.* 1925. Mar. 31. Vol. 19. No. 1. pp. 23–36. [7 refs.]

The estimation of the ionic calcium in sprue has a twofold purpose, firstly as a means of diagnosis, and, secondly, as a gauge in estimating the course of the disease. There may be two types of calcium deficiency due either to excessive excretion and consequent calcium starvation of the tissues, or, the total being normal, the active ionic calcium is decreased. In sprue it is the latter. The error would appear to lie in the failure on the part of the tissues to use the calcium absorbed from the alimentary canal. The underlying factor is some circulating toxin which acts either by effecting a combination with the blood calcium or by interfering with the function of the parathyroids. Toxic substances are said to stimulate thyroid function, and the antagonistic action of this gland to that of the parathyroid is exemplified in sprue. Should an impure preparation of parathyroid be used in treatment or, when progress is being made, this substance be stopped and thyroid given in its place, a return of sprue symptoms can be readily induced. The value of the calcium estimation test in diagnosis is well illustrated by the record of a case in which no reduction of the ionic calcium was found, although sprue-like symptoms were present. On further examination the patient was found to be suffering from a chronic infection with *Entamoeba histolytica*.

A table shows the ionic and total calcium estimation in 32 cases of sprue. The average ionic calcium content works out at 6·9 per cent., the total calcium at 9·7 per cent. In 105 cases, other than sprue, *i.e.*, amoebic and bacillary dysentery, mucous colitis and syphilis, malaria, kala azar, filariasis, undulant fever, etc. the ionic calcium averaged 10·2 per cent. Important as is this test in diagnosis, it is more so as an indication of progress. The serum should be examined at intervals of a week or a fortnight. Any return of symptoms such as a sore

tongue or aphthae is accompanied by a drop in the ionic calcium. The following statements are justifiable.

"1. Ionic calcium is always low in the untreated disease, even in the early stages.

"2. The ionic calcium increases as the condition improves.

"3. The ionic calcium falls again if a relapse occurs.

"4. Improvement takes place when calcium is administered alone, but is slower and less stable than when parathyroid is given in addition."

These points are emphasized by illustrative cases. The improvement, as evidenced both by the clinical condition and by the rise in the ionic calcium in the serum, is more rapid when, in addition to calcium, parathyroid is given to regulate its metabolism.

Two tables are given to illustrate this point. The first shows the slow and gradual rise in the ionic calcium which takes place under ordinary treatment, the second the rapid increase from 6·9 per cent. to 11·6 per cent. which takes place sometimes within a period of eight weeks in cases treated with calcium and parathyroid.

P. H. M-B.

Scott (H. Harold). **The Treatment of Sprue.**—*Lancet.* 1925. Mar. 21. pp. 620–621. [1 ref.]

Until recently sprue patients were advised against returning to the tropics, but recent rational methods of treatment bring about a rapid and permanent cure if the case is taken in hand early. Under empirical methods, the author discusses the apparent value of the milk treatment, and the strawberry cure, but he points out that fruit can only form a small part of the dietary. The administration of vaccines is, in some cases, attended by good results; but the organism cultivated cannot be the sole causative agent since very different organisms produce apparently equal beneficial effects. Yellow santonin and emetine which have been most extensively used in treatment are uncertain.

The calcium and parathyroid treatment is a rational one based upon laboratory tests. The fatty diarrhoea, the cramps, the oedema and tetany are some of the symptoms attributable to faulty calcium metabolism. In sprue, but in no other sprue-like conditions, the free or ionic calcium in the blood is reduced by 30–40 per cent. It is the regulation of calcium which is upset. By flooding the system with calcium this deficiency is temporarily made good and improvement ensues. This regulation of calcium is controlled by the parathyroid glands, so that when this extract is given twice daily in doses of $\frac{1}{10}$ gr. the symptoms of sprue clear up with marvellous rapidity. The stomatitis disappears in ten days or so, the colour returns to the faeces in two to three weeks.

The technique of estimating the ionic calcium is as follows:—

1½–2 cc. of blood in a serum tube is allowed to clot yielding 1 cc. of serum which is heated in a water-bath to 56°C. for one hour. By adding fixed amounts of various dilutions of ammonium oxalate to 10 volumes of fresh normal serum the strength of oxalate which will just prevent clotting is found. By adding two volumes of various dilutions of calcium chloride the dilution just sufficient to bring about complete clotting of the blood is determined. By calculation the calcium content of the serum is estimated, which in normal persons is between 10·4 and 11·4 mg. per 100 cc. In severe sprue cases it is about 6·5 mg.

Treatment consists of putting the patient to bed for the first 14 days, allowing milk only, beginning with 3½–4 pints daily and increasing by ½ pint in the 24 hours till 7 to 7½ pints are reached. Calcium lactate is given in cachets, containing 15 gr. each, thrice daily and parathyroid extract gr. $\frac{1}{10}$th twice daily, and it is absolutely essential that it should be free from thyroid extract. Constipation should be corrected with liquid paraffin. From the tenth day onwards plain biscuits should be allowed by which time the ionic calcium has increased to between 7 and 8 mg. per cent. At the end of three weeks the average patient can take milk puddings, eggs, fish, potato, carrot and bananas; and in the fourth week chicken and fruits. The calcium can be reduced in the third to fourth week and stopped at the end of the fourth. The parathyroid extract should be continued in full doses till the fifth week, then reduced until it is stopped altogether at the end of six weeks. This, however, can only be gauged with certainty by the blood test.

P. H. M-B.

FIELD (P. C.). **Treatment of Sprue by Parathyroid Extract.**—*Jl. Roy. Army Med. Corps.* 1925. June. Vol. 44. No. 6. pp. 456–457.

The patient was a multipara, who, during a pregnancy of seven and a-half months, suffered from well-marked symptoms of sprue. On her admission to hospital it was difficult for her to assimilate even milk. Within one week of careful dieting, calcium lactate 30 gr. daily and parathyroid gr. one-fifth, with a daily bowel-wash of saline, a great improvement was recorded. Nine days after admission a premature child of 4 lb. 12 oz. was born, after which great improvement took place, so that she was discharged after six weeks treatment. The total amount of parathyroid taken was $7\frac{9}{10}$ gr.

This case is said to illustrate the remarkable response to parathyroid medication. During the frothy-motion stage bowel-washes are of undoubted value, though possibly responsible for the premature labour. When last seen the patient had regained her weight (Jan. 1925).

P. H. M-B.

CASTELLANI (Aldo). **Beneficial Action of Raw Pancreas in Certain Cases of Sprue. Insulin in Cases of Sprue complicated with Diabetes** —*Jl. Trop. Med. & Hyg.* 1925. June 15. Vol. 28. No. 12. pp. 230–231.

In the routine treatment of sprue the patient is kept at complete rest in bed on a strict milk diet, diluted at first with Vichy or plain water. In most cases bicarbonate of soda, gr. xxx–one drachm, is given t.d.

Raw pancreas from lambs, sheep or calves is used; it must be absolutely fresh, minced or sieved, and is eaten by the patients in teaspoonful to tablespoonful doses with milk once or twice daily. When raw pancreas is unobtainable, pancreatic tablets of Armour are used, though their action is not to be compared to that of the whole gland.

In three cases of sprue, complicated by diabetes, the administration of insulin caused the disappearance of the glycosuria and polyuria, but had no action on the sprue symptoms. Raw pancreas given by the mouth influenced the sprue beneficially, but did not control the glycosuria.

P. H. M-B.

ELDERS (C.). **Blood Changes in Sprue and Pernicious Anaemia.**—*Lancet.* 1925. June 13. p. 1274. [Correspondence.]

This correspondence [*ante*, p. 371] has elicited the fact that the figures of the haemoglobin index, as published by Elders, have been calculated with Sahli's haemoglobinometer, in haemometer degrees of which 80 correspond to 100 per cent. haemoglobin (the normal). In order to obtain percentages, one has to calculate them; thus, 20 Sahli is equal to 25 per cent. haemoglobin. On the Continent it is customary to speak of percentages when haemometer degrees of Sahli's new haemometer are meant; this is a source of much confusion.

P. H. M-B.

GORDON (A. H.). **A Case of Sprue.**—*Canadian Med. Assoc. Jl.* 1925. May. Vol. 15. No. 5. pp. 522–523.

There appears to be nothing remarkable about this occurrence of sprue in a Scotsman who had long resided in Cuba, save that he was treated with strawberries which he had to purchase "out of season."

P. H. M-B.

REVIEWS AND NOTICES.

DEEKS (W. E.). **Malaria—Its Cause, Prevention and Cure.**—30 pp. With 19 text figs., 1 map & 3 coloured plates. 1925. Feb. 16. United Fruit Company, 1 Federal Street, Boston, Mass.

In this pamphlet the main facts regarding the biology of malaria parasites and the causation and prevention and treatment of malarial fevers are brought together for the convenience of "physicians, sanitarians, social workers, school teachers and intelligent laymen." As is inevitable in a project where two such mighty opposites as conciseness of form and promiscuity of purpose are conjoined, many statements and explanations that impart quite sufficiently accurate impressions to the gentle reader will prove for the practitioner to be too unconditional or too ingeniously simple. On the whole, the facts are well and lucidly set forth, and it can only be owing to a sheer temporary oblivion that the parasite of benign tertian is set down as generally sporulating in the visceral capillaries and seldom in the peripheral blood.

A. Alcock.